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UNITED STATES DEPARTMENT OF AGRICULTURE

Soil Survey
of
Dallas County, Alabama

By

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Bureau of Chemistry and Soils

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SOIL SURVEY OF DALLAS COUNTY, ALABAMA

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COUNTY SURVEYED

Dallas County is situated a little southwest of the center of Alabama (fig. 1). Selma, the county seat, is 50 miles west of Montgomery, about 75 miles south of Birmingham, and 140 miles northeast of Mobile. The boundaries of the county are very irregular, but the general outline approaches that of a square, with the exception of an extension of about 120 square miles in the northeastern corner. The area of the county is 985 square miles, or 630,400 acres.

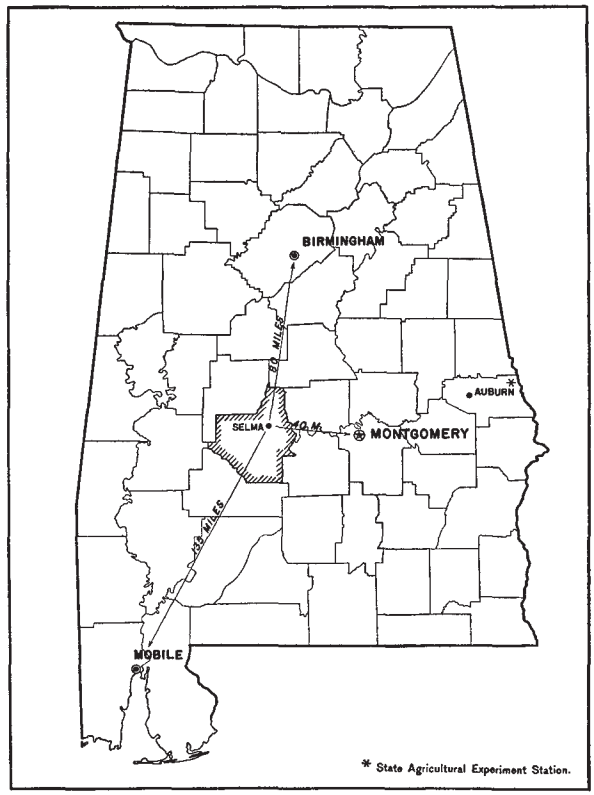

FIGURE 1.—Sketch map showing location of Dallas County, Ala.

Dallas County has four kinds of relief, as shown on the accompanying sketch map (fig. 2)—(1) undulating prairies, (2) central plains and high terraces, (3) river terraces and first bottoms, and (4) hilly uplands.

The undulating prairie section includes the greater portion of the western and northwestern parts of the county lying west of Cahaba River and Boguechitto Creek. It includes the territory in the vicinities of Marion Junction, Browns, and Safford. The surface features range from almost level to undulating and gently rolling areas in which are many long, smooth, gentle slopes extending from the crests of the ridges to the natural drainageways. With the exception of the flatter areas, all this upland part has good natural

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surface drainage. The streams have cut broad, shallow valleys, ranging from a few feet to more than 30 feet below the general level.

The central plains and high terraces are developed in the east-central part of the county in the vicinity of Berlin and west thereof to Alabama River, in the vicinity of Orrville between Boguechitto Creek and the terraces along Alabama River, and between Selma and Summerfield. This area consists of a series of benches, or old river

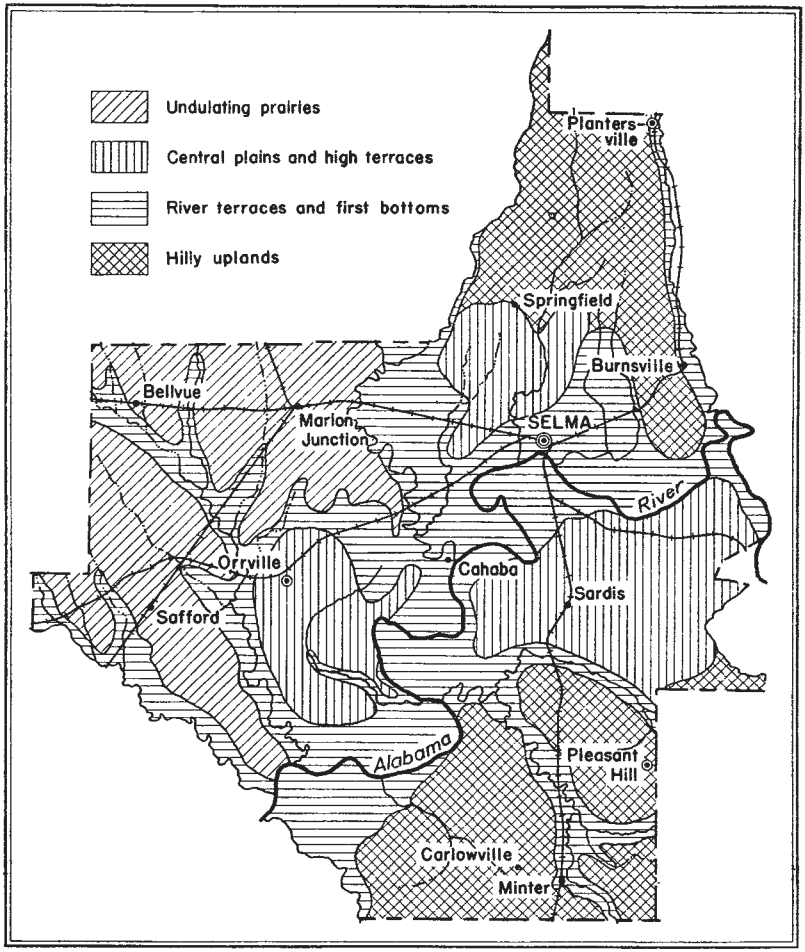

FIGURE 2.—Sketch map showing different kinds of relief in Dallas County, Ala.

terraces, with differences in elevation from about 10 to 50 feet. The surface, for the most part, is almost level or undulating, but the marginal parts resemble the hilly uplands. Throughout the central-plains part are long, narrow, parallel swales and also some shallow "gum ponds" and well-defined depressions. The elevation of this central plain in the vicinity of Orrville is approximately 50 to 60 feet higher than the bottom lands along Big Swamp Creek. With the exception of the swales and depressions, all the soils in the central-plains region are naturally well drained or can be drained easily by open ditches.

The river terraces and first bottoms are confined to extensive areas along Alabama River, Cahaba River, and Boguechitto, Chilatchee, and Cedar Creeks. The relief of this part of the county is dominantly flat, but in places it slopes gently in the direction of the flow of the stream. The second-bottom areas commonly lie above normal overflow but are covered with water during times of heavy overflow, whereas the first-bottom areas and the lower lying second bottoms are subject to frequent overflow. Throughout the river terraces and first bottoms are numerous small swales and depressions and also a few rather large swamplike areas.

The hilly uplands are confined largely to the extreme northeastern and southeastern parts of the county. The general elevation of these areas is 100 or more feet above the central plains or the river terraces. The relief is characterized by a few broad areas and many small, narrow, winding, flat to smooth areas with steep hillsides and broken and gullied areas. Carlowville Ridge is a high, flat divide separating the drainage into Cedar Creek from that into Alabama River, the greatest width being less than 2 miles. It drops off sharply on the south and west into hilly, broken country, lying at somewhat lower levels. Wildcat Hill and Morgan Hill are conspicuous features of the landscape in this area. Most of the hilly uplands, particularly in the northeastern projection of the county, are deeply dissected by streams which have cut deep, narrow, V-shaped valleys and, in many places, gulches, with a depth ranging from 50 to more than 100 feet below the general level of the country. These streams are rapidly cutting back into the smoother ridges, resulting in serious erosion of the soils. Drainage throughout the hilly upland area is good to excessive.

The elevation of the county ranges from 120 to 300 feet above sea level, the lowest position being along Alabama River where it leaves the county, and the highest elevations being in the northeastern part. Alabama River flows in a channel eroded 40 to 50 feet into the Selma chalk and Ripley formations. The upper 15 or 20 feet of the banks usually consist of sandy materials that admit of the free movement of water, which gives good drainage to the adjacent soils.

Alabama River follows a meandering course across the county from northeast to southwest. This stream and its tributaries furnish the main drainage outlets for the soils. Numerous small creeks and branches and intermittent drainageways ramify all parts of the county and afford excellent drainage for the greater part of it. The areas of swamp, meadow, and some of the soils in the first bottoms and on the terraces, as well as a few areas of flat uplands, are naturally poorly drained.

Throughout the sandy uplands the predominant trees are longleaf and shortleaf pines, oaks, and gums, and along the smaller streams gums, maple, and willow predominate. In the wooded parts of the prairie area the principal trees are post oak, hickory, gums, haw, and yaupon, together with some shortleaf pine and old-field pine, but practically no trees grow on the true prairie land. Johnson grass, several kinds of clover, and numerous coarse weeds and grasses are the principal vegetation on the soils of the prairies.

Good drinking water from deep wells and springs can be obtained, and artesian wells are common on the second bottoms along the

river and in places on the prairies. Additional artesian wells could be bored at small cost.

Dallas County was created by an act of the legislature in February 1818, 1 year after Alabama was organized as a territory and 1 year before it was reorganized as a State. The territory from which Dallas County was formed was taken from Montgomery County and was named in honor of A. J. Dallas of Pennsylvania.

Soon after 1818, when warfare with the Creek and Cherokee Indians had largely ceased, immigrants came from Virginia, North Carolina, South Carolina, Georgia, and Tennessee, and many of the white inhabitants in the county today are descendants of this stock. In 1820 a majority of the 6,000 inhabitants were white, whereas in 1870 the population of 40,000 was about four-fifths Negro. The population, according to the 1930 census report, is 55,094, of which 25.8 percent is white and 74.2 percent is Negro.

Dallas County has good railroad transportation facilities. Several branches of the Southern Railroad traverse the county, the Western Railway of Alabama comes into Selma from Montgomery, and a branch of the Louisville & Nashville Railroad runs south from Selma. United States Highway No. 80, a concrete-surfaced road, crosses the county in an east-west direction, and there are other hard-surfaced roads. In addition to these, numerous well-graded sand-clay and gravel roads are in all parts.

Selma is at the head of all-year navigation on Alabama River. Much cotton and other products, commercial fertilizer, and general merchandise are carried by boats. Selma, with a population of 18,012, is the only city. Orrville is the largest town. Small villages, such as Minter, Marion Junction, Browns, Martins Station, Safford, Carlowville, and Plantersville. are numerous.

Churches and schools for both the white and the Negro population are well distributed. Consolidated schools for white children are located at convenient places. Telephone lines and rural delivery of mail extend to all parts of the county. A high-tension power line crosses the county. The State Black Belt Experiment Station is located on representative soils of the prairies near Marion Junction.

Selma has a large number of industries, many of which use products grown in the county. One mill converts large quantities of cottonseed into meal and oil, another makes peanut butter and oil, two mills manufacture cotton thread and cotton cloth, and one mill makes cotton bags. In addition, a furniture factory, a veneer mill, a lumber mill, and other smaller industries use local products. Many small sawmills are distributed throughout the county in the wooded areas. Some cross ties are cut, and staves are manufactured.

A considerable part of the crops grown is converted into finished products and shipped to outside markets. A creamery, which manufactures ice cream and butter, is located in Selma. Some of this is sold locally, but the greater part is shipped to Birmingham and other outside markets. Cattle, sheep, and hogs are sold to buyers at the stockyards in Selma and are slaughtered. Much of the cotton is shipped to distant markets.

CLIMATE

Dallas County has a temperate climate. The summers are long and warm, the heat is moderate, and cooling breezes are frequent.

Pleasant days, which prevail throughout the winter, are frequently interspersed with cold spells and disagreeable cold rains. As a rule, very little snow or sleet falls. The spring and fall seasons are mild and pleasant. In general, the climate is healthful.

The average growing, or frost-free, season is 248 days. The average date of the latest killing frost is March 12, and that of the earliest is November 15. The mean annual precipitation of 50.44 inches is well distributed throughout the year, being especially favorable during the growing season. September, October, and November are the driest months. This affords favorable conditions for the maturing and harvesting of the staple crops.

The abundant rainfall and the mild temperature are conducive to diversified agriculture. Farm work can be performed throughout the year, except when rain hinders. Hardy vegetables, such as turnips, cabbage, and collards, can be grown during winter, although extreme cold spells at times may kill the cabbage and collards. Lettuce, beets, onions, and radishes can be produced in early spring. Winter cover crops, including Austrian Winter peas, vetch, oats, and rape, are successfully grown. Because of the length of the growing season, native grasses and legumes afford good pasture for about 9 or 10 months, an advantage for dairy and livestock farming.

Table 1 gives the normal monthly, seasonal, and annual temperature and precipitation, as compiled from the records of the United States Weather Bureau station at Selma, which are fairly representative for the county as a whole. The highest temperatures and the lowest rainfall occur in the prairie section and the lowest temperatures and the highest rainfall in the hill country in the northeast.

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation at Selma, Dallas County, Ala.*

[Elevation, 147 feet]

Month	Temperature			Precipitation			
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1930)	Total amount for the wettest year (1919)	Snow, average depth
	°F.	°F.	°F.	Inches	Inches	Inches	Inches
December	46.6	80	11	5.00	2.06	12.86	0.1
January	48.3	81	10	4.84	4.06	5.69	.4
February	49.3	84	−5	5.49	1.19	8.32	.3
Winter	48.1	84	−5	15.33	7.31	26.87	.8
March	58.5	92	21	6.13	4.11	6.91	(1)
April	64.1	94	29	4.31	2.32	4.27	(1)
May	72.7	100	38	3.41	2.24	5.88	0
Spring	65.1	100	21	13.85	8.67	17.06	(1)
June	79.7	105	49	3.90	.59	2.19	0
July	81.5	105	59	4.93	2.23	5.32	0
August	81.0	104	58	4.35	4.52	11.50	0
Summer	80.7	105	49	13.18	7.34	19.01	0
September	76.4	102	42	2.65	5.69	.79	0
October	66.2	98	29	2.28	1.24	3.00	0
November	52.9	88	18	3.15	4.75	6.39	(1)
Fall	65.2	102	18	8.08	11.68	10.18	(1)
Year	64.8	105	−5	50.44	35.00	73.12	.8

[1] Trace.

AGRICULTURAL HISTORY AND STATISTICS

Agricultural history dates from the early settlements about 1816. The early settlers took up land along the river and larger streams, locating their homes on the higher terraces and uplands, and developed the productive alluvial soils for farming. As more settlers arrived the more desirable lands throughout the county were rapidly taken. The settlers' first concern was to provide the necessities of life, therefore they produced mainly food crops, such as corn, wheat, oats, potatoes, and vegetables, and also some rice and tobacco. A few head of livestock were pastured on the open range. Cotton soon became the principal cash crop. It was first ginned and baled, then hauled to the river landings and shipped to outside markets where it was sold or was exchanged for supplies. The early farmers used no commercial fertilizers but opened new lands when the yields on the old lands became unsatisfactory.

With the exception of the prairie section, the entire county was originally heavily forested with longleaf and rosemary (loblolly) pines, and oaks and other hardwoods flourished on the bottom lands. Much of this valuable timber was destroyed when the lands were cleared.

Cotton has always been the chief, almost the exclusive, ready-money crop in this section. On the large plantations operated by slave labor some rice and tobacco were grown, with corn to feed the livestock and hogs to make pork for the slaves, but cotton was then, as now, the staple farm product, to the production of which all other operations were adjusted. As in the cultivation of this staple the essential operation was the picking, the main consideration was to plant as much cotton as the slaves could gather.

As lands were cheap, many farmers acquired large holdings or plantations containing thousands of acres. This system of land-holding continued to increase in importance up to the time of the Civil War. After the war, the changed conditions of labor made it impossible to continue the plantation system of cultivating the large tracts; consequently most of these tracts were divided into small farms and operated by tenants.

Very few of the old plantations remain. At present, most of the land is held in large tracts, but of more recent acquisition, and is worked under the tenant system. The 1935 Federal census reports that 13.6 percent of the farms are operated by owners, 86.2 percent by tenants, and 0.2 percent by managers.

When the price of cotton was high the average tenant produced mainly cotton as a cash crop. He grew very little corn or other crops for his family or for his work animals. When the price of cotton dropped to the point where there was little or no profit in its production, the tenants were unable to buy their usual food and feed supplies. To remedy that condition, they were urged to grow less cotton and to plant more corn and other crops.

At present, the more progressive tenant produces cotton as a cash crop; but he also grows corn for his own use, for his work animals, and for fattening hogs raised for home use. He also grows sugarcane, sorgo, sweetpotatoes, vegetables, peanuts, and pea hay, for food and feed.

The use of fertilizers has been increasing continuously, as shown by the census statistics. The amount expended for fertilizers in 1879 was $9,815; in 1889, $54,649; in 1899, $33,170; in 1909, $118,977; in 1919, $268,702; and in 1929, $319,304. Since 1929 the amount of fertilizers used has decreased, but this is believed to be only a temporary condition, and as times become more nearly normal the use of fertilizers probably will again show a steady increase.

Practically all the hired laborers on farms are Negroes. Most of the farm work of the tenant is performed by members of the family. Extra labor is used as needed.

According to the census reports, the number of farms increased from 4,276 in 1880 to 8,182 in 1910 and then decreased to 7,096 in 1930. The average size decreased from 108 acres in 1880 to 56.8 acres in 1910 and increased to 72.5 acres in 1930. According to the 1935 Federal census, 7,025 farms, with an average size of 59.2 acres, comprised 67.9 percent of the county. The average value of land and buildings per farm was $1,006, or an average land value of $16.98 an acre in 1935.

According to information obtained from the county agent, 85 percent of the farms operated by tenants are rented for cash. The average rental for soils of the smooth uplands and higher river terraces for the land cultivated, which includes only a small part of each farm, is about $4 an acre; for hilly uplands, about $2.50 an acre; and for prairie soils,[1] $4 an acre. Nonagricultural or marginal lands rent for less. About 12 percent of the farms are rented for half the crop, where the owner furnishes the land, work animals, equipment, seed, and half the fertilizer, and the tenant furnishes the labor and half the fertilizer. About 3 percent of the farms are rented for one-third of the cotton crop and one-fourth of the corn crop. A few individual arrangements are made whereby the tenant pays his rent in a specified number of pounds of lint cotton an acre.

Farms operated by owners are generally well equipped. They have good dwellings and also large barns and sheds for the livestock, and some of the larger places are equipped with electric lights and running water. On the whole, improved machinery is used by about 10 percent of the farmers, but there is a small steady increase in its use, especially in the use of riding and improved walking cultivators. A few tractors with tractor equipment, plows, harrows, and disks are in use in various parts of the county. The tenant farms, as a rule, have poor buildings and the simplest kinds of farm equipment. The tenant on a one-plow farm (25 or 30 acres) has a mule or horse, a wagon, a plow, a one-row fertilizer drill and seeder, and a few hand implements. For field work, mules are predominantly used, but a few horses and occasionally work cattle are used. Very few work animals, horses or mules, are raised.

Practically all of the owners and about 60 percent of the tenants keep one or more milk cows for domestic use, with the Jersey breed predominating. The hogs raised have shown a steady improvement over the once common "piney woods" hog and also a steady increase

[1] Although locally known as "prairie soils" these soils are not true Prairie soils, such as those of Iowa. They owe their black color and other characteristics to the soft, highly calcareous parent material from which they have developed and belong with the group of Rendzina soils.

in numbers. The most common breeds are Poland China and Duroc-Jersey. The increase in production is to supply pork for home use and for local demand, but production does not yet meet this local demand. Some sheep are raised, but sheep raising is not popular with the tenants. About 350 lambs were marketed in 1931. Goats, which are hardier and more self-sustaining, are more commonly raised by the tenants. Chickens and guinea fowls are generally kept by both owners and tenants. A few tenants produce enough eggs for home use and an occasional small surplus for market, but most of the eggs that are marketed are produced by the landowners. Turkey raising, which has been increasing during recent years at a rate of from 10 to 15 percent a year, is important in many parts. It is fairly common among the tenants, but most of the turkeys for market are produced by the landowners. In 1931 about five carloads of live turkeys were marketed at a cash value of about $12,600.

Table 2, compiled from the reports of the Federal census, shows the acreage devoted to the principal crops in the years 1879, 1889, 1899. 1909, 1919, 1929, and 1934.

TABLE 2.—*Acreage of the principal crops in Dallas County, Ala., in stated years*

Crop	1879	1889	1899	1909	1919	1929	1934
	Acres	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*
Cotton	115,631	135,048	156,810	153,473	98,379	107,150	63,818
Corn	46,542	45,373	51,607	38,562	60,666	44,811	62,502
Oats	8,260	6,975	3,219	3,885	1,690	198	690
Sweetpotatoes	2,256	3,227	2,429	1,877	3,138	2,916	3,924
Potatoes	(1)	64	602	638	170	60	48
Peanuts	----------	251	614	666	1,758	1,176	2,877
Dry peas	(1)	(1)	1,492	1,200	3,009	1,518	4,208
Dry edible beans	(1)	(1)	7	3	12	410	239
Sugarcane	18	357	562	452	522	565	260
Sorgo	(1)	333	108	158	1,559	895	----------
Hay	900	2,290	4,440	9,188	18,237	18,488	20,661
	Trees	*Trees*	*Trees*	*Trees*	*Trees*	*Trees*	*Trees*
Apples	----------	6,601	13,897	4,624	3,547	1,101	1,447
Peaches	----------	16,435	39,158	30,229	13,244	6,701	14,641
Pears	----------	430	3,519	1,229	1,412	1,011	1,426
Figs	----------	(1)	344	981	2,663	1,271	(1)
Pecans	----------	(1)	1,418	688	10,426	13,279	(1)

[1] Not reported.

From table 2 it is observed that the most important change in crops has been a large reduction in the acreage of cotton. In 1919, 98,379 acres were planted to cotton as contrasted with 153,473 acres in 1909. This area had been further reduced to 63,818 acres in 1934. Mainly because of the cotton-reduction program, the acreage of land from which crops were harvested was 9 percent less in 1934 than in 1929. As the cotton acreage decreased the acreage of corn increased. Corn increased more than 17,000 acres between 1929 and 1934, and the production in 1934 exceeded that of 5 years previous by about 50,000 bushels. A notable increase has been made in the production of peanuts since 1909, as well as in the acreage of sorgo (sweet sorghum). The amount of hay grown has changed markedly from 1889 to 1934. The growing of pecans began about 1899, and by 1929 there were 13,279 trees. Dallas County had a larger crop of sweetpotatoes harvested in 1934 than any other county in the State, except

Cullman, according to the 1935 census. Sweetpotatoes totaled 3,924 acres in 1934, an increase of about 35 percent over the acreage of 1929.

Cattle numbered 37,716 in 1935, an increase of about 31 percent over the number in 1930. Cows increased more than 6,000, or from 15,014 in 1930 to 21,158 in 1935.

Table 3 shows the number of domestic animals on farms in 1880, 1890, 1900, 1910, 1920, 1930, and 1935.

TABLE 3.—*Number of livestock on farms in Dallas County, Ala., in stated years*

Livestock	1880	1890	1900	1910	1920	1930	1935
Horses	2,567	2,806	3,454	3,629	4,139	2,039	1,725
Mules	5,555	5,518	6,454	6,510	6,683	8,167	6,570
Cattle	16,806	17,814	19,982	24,684	31,907	28,654	37,716
Swine	23,442	29,835	30,218	34,184	37,289	26,500	20,577
Sheep	1,860	1,570	677	585	915	1,856	1,867
Goats			1,821	1,352	2,949	1,302	1,898
Chickens	[1] 77,948	128,297	[2] 130,043	[1] 116,366	127,958	114,008	112,533

[1] Includes all poultry.
[2] Includes guinea fowls.

SOIL-SURVEY METHODS AND DEFINITIONS

The soil survey of Dallas County was made to obtain a more modern classification of its soils; to show the distribution and location of the soils suitable for the growing of crops, pastures, and trees; to enable those interested in the use of the soils to select them more readily according to their best use; to use on their own lands, such crops and methods as have proved successful on similar soils in other parts of the State or in other parts of the Atlantic Coastal Plain or Black Belt; and to aid such agencies as the State agriculture experiment station, the State extension service, and the county agent to furnish more specific suggestions concerning the use and improvement of the soils in the county.

Soil surveying consists of the examination, classification, and mapping of soils in the field.

The soils are examined systematically in many locations. Test pits are dug, borings are made, and exposures, such as those in road or railroad cuts, are studied. Each excavation exposes a series of distinct soil layers or horizons called, collectively, the soil profile. Each horizon of the soil, as well as the parent material beneath the soil, is studied in detail; and the color, structure, porosity, consistence, texture, and content of organic matter, roots, gravel, and stone are noted. The reaction of the soil [2] and its content of lime and salts are determined by simple tests. The drainage, both internal and external, and other external features, such as the relief, or lay of the land, are taken into consideration, and the interrelation of soils and vegetation is studied.

The soils are classified according to their characteristics, both internal and external, special emphasis being given to those features

[2] The reaction of the soil is its degree of acidity or alkalinity expressed mathematically as the "pH value." A pH value of 7 indicates precise neutrality, higher values indicate alkalinity, and lower values indicate acidity.

influencing the adaptation of the land for the growing of crop plants, grasses, and trees. Upon the basis of these characteristics soils are grouped into mapping units. The three principal units are: (1) Series, (2) type, and (3) phase. In places two or more of these principal units may be in such intimate or mixed pattern that they cannot be clearly shown separately on a map but must be mapped as (4) a complex. Areas of land, such as coastal beach or bare rocky mountain sides, that have no true soil are called (5) miscellaneous land types.

The most important of these groups is the series, which includes soils having the same genetic horizons, similar in their important characteristics and arrangement in the soil profile, and developed from a particular type of parent material. Thus the series includes soils having essentially the same color, structure, and other important internal characteristics and the same natural drainage conditions and range in relief. The texture of the upper part of the soil, including that commonly plowed, may vary within a series. The soil series are given names of places or geographic features near which they were first found. Thus Norfolk and Houston are names of important soil series.

Within a soil series are one or more soil types, defined according to the texture of the upper portion of the soil. Thus the class name of the soil texture, such as sand, loamy sand, sandy loam, loam, silt loam, clay loam, silty clay loam, and clay, is added to the series name to give the complete name of the soil type. For example, Norfolk fine sandy loam and Norfolk loamy sand are soil types within the Norfolk series. Except for the texture of the surface soil, these soil types have approximately the same internal and external characteristics. The soil type is the principal unit of mapping and because of its specific character is usually the soil unit to which agronomic data are definitely related.

A phase of a soil type is a subgroup of soils within the type which differ from the type in some minor soil characteristic that may, nevertheless, have an important practical significance. Differences in relief, stoniness, and degree of accelerated erosion are frequently shown as phases. Thus, for example, within the normal range of relief for a soil type, there may be portions which are adapted to the use of machinery and the growth of cultivated crops and other portions which are not. Even though there may be no important differences in the soil itself or in its capability for the growth of native vegetation throughout the range in relief, there may be important differences in respect to the growth of cultivated crops. In such an instance the more sloping portions of the soil type may be segregated on the map as a sloping or hilly phase. Similarly, soils having differences in stoniness may be mapped as phases even though these differences are not reflected in the character of the soil or in the growth of native plants.

The soil surveyor makes a map of the county or area, showing the location of each of the soil types, phases, complexes, and miscellaneous land types, in relation to roads, houses, streams, lakes, section and township lines, and other local cultural and natural features of the landscape.

SOILS AND CROPS

Dallas County is one of the most important agricultural counties in the State. It contains 630,400 acres, of which 162,337 are in crops, according to the census of 1935. In addition, 24,412 acres are idle or fallow, 53,976 acres in plowable pasture, 57,847 acres in woodland pasture, and 22,315 acres in other pasture.

In addition to meadow, swamp, dune sand, and Guin soils, undifferentiated, 34 soil types and 10 phases have been mapped. Many of these soils are different in color, texture, structure, drainage conditions, and susceptibility to erosion, all of which influence crop production and land use. Detailed information relative to these individual types and groups of soils is given in the subsequent pages of this publication. The characteristics of soils in various parts of the county influence the agriculture and the kinds of crops grown. In this county, as in several of the other prairie counties in Alabama, differences in its soils are marked, and a clear relationship exists between the soils and the agriculture practiced.

The agriculture of the county consists principally of the production of cotton, corn, and hay. Cattle raising and dairying are also important.

According to the Federal census for 1935, which includes an inventory of the items for the year 1934, 63,818 acres were planted to cotton, producing 19,198 bales, more than 10,000 bales less than produced in 1929. This decrease is due largely to the restriction of the cotton acreage throughout the South. Cotton meets the needs of a cash crop and has been for a long time the main crop on which both the landowner and tenants can obtain credit and security for rent, supplies, and fertilizer. Farmers understand the growing of cotton and are averse to the substitution of another crop. Cotton finds a ready market for cash at all times and can be stored in warehouses and kept for a long time with but little deterioration.

Prior to the advent of the boll weevil in 1914, the prairie soils and associated clay soils were used extensively for the production of cotton and were considered among the best soils in the State for this crop. These soils, because of their heavy texture, compact structure, and lateness in warming in the spring, mature cotton later than the sandy soils, and the weevils ruin most of the crop. These soils cannot be used profitably, therefore, for cotton under boll-weevil conditions. As a result, the raising of livestock; the production of hay, particularly Johnson grass; and dairying have supplanted cotton growing to a large extent.

Corn was grown on 62,502 acres in 1934. It is well distributed throughout the county except on some of the prairie soils. The corn is produced for feeding work animals and fattening hogs and is ground into meal for home consumption.

All hay and sorgo grown for forage included 20,922 acres in 1934. A large part of this hay was produced in the prairie section. Some of it is sold for cash, and a considerable part is fed to dairy and beef cattle.

In 1935, 37,716 cattle were on farms, a large increase over the number in 1930. Of these a considerable number are dairy cows, and a

large amount of milk and cream is sold annually. In 1935, 20,577 hogs were on farms. Some pork is sold, the remainder of the meat being used on the farms.

The crops of minor importance are sweetpotatoes, potatoes, peanuts, sugarcane, and oats.

The large number of different soils in the county can be grouped, according to their soil characteristics based on agricultural uses, into three general classes: (1) Soils of the sandy uplands and river terraces, (2) soils of the clay uplands and prairies, and (3) miscellaneous soils and land types.

In the following pages the soils are described in detail, and their agricultural relationships are discussed; their location and distribution are shown on the accompanying soil map; and their acreage and proportionate extent are given in table 4.

TABLE 4.—*Acreage and proportionate extent of the soils mapped in Dallas County, Ala.*

Soil type	Acres	Percent	Soil type	Acres	Percent
Ruston fine sandy loam	23,232	3.7	Bell clay	17,728	2.8
Orangeburg fine sandy loam	9,472	1.5	Bell clay, poorly drained phase	4,928	.8
Red Bay fine sandy loam	8,960	1.4	Catalpa clay	28,608	4.6
Blakely loam	448	.1	Oktibbeha clay	14,784	2.3
Akron loam	9,600	1.5	Vaiden clay	11,328	1.8
Norfolk fine sandy loam	36,224	5.7	Vaiden fine sandy loam	11,136	1.8
Norfolk fine sandy loam, poorly drained phase	4,096	.6	Eutaw clay	24,384	3.9
Norfolk loamy sand	7,296	1.2	Ruston fine sandy loam, hilly phase	28,672	4.6
Susquehanna fine sandy loam	8,000	1.3	Red Bay fine sandy loam, hilly phase	9,536	1.5
Kalmia fine sandy loam	11,776	1.8	Susquehanna clay	8,256	1.3
Kalmia loamy fine sand	4,864	.8	Plummer fine sandy loam	10,048	1.6
Wickham loam	8,960	1.4	Sumter clay, hilly phase	10,816	1.7
Wickham fine sandy loam	19,008	3.0	Oktibbeha clay, hilly phase	4,160	.7
Cahaba fine sandy loam	10,880	1.7	Leaf clay loam	11,584	1.8
Cahaba fine sandy loam, mixed phase	1,664	.3	Leaf very fine sandy loam	17,216	2.7
Cahaba loamy sand	14,016	2.2	Myatt fine sandy loam	26,880	4.2
Amite fine sandy loam	3,648	.6	Kalmia fine sand	8,064	1.3
Augusta fine sandy loam	5,696	.9	Ochlockonee fine sandy loam	8,256	1.3
Augusta silt loam	11,072	1.8	Ochlockonee silt loam	8,448	1.3
Augusta silt loam, mixed phase	4,480	.7	Guin soils, undifferentiated	71,104	11.3
Leaf fine sandy loam	34,048	5.4	Meadow (alluvial material)	21,632	3.4
Houston clay	2,368	.4	Swamp	4,864	.8
Houston clay, eroded phase	1,280	.2	Dune sand	128	.1
Sumter clay	14,528	2.3	Total	630,400	
Sumter clay, mixed phase	12,224	1.9			

SOILS OF THE SANDY UPLANDS AND RIVER TERRACES

The soils of the sandy uplands and river terraces are included in one broad group. Ruston fine sandy loam; Orangeburg fine sandy loam; Red Bay fine sandy loam; Blakely loam; Akron loam; Norfolk fine sandy loam; Norfolk fine sandy loam, poorly drained phase; Norfolk loamy sand; and Susquehanna fine sandy loam are soils of the sandy uplands. These soils, except Susquehanna fine sandy loam which is underlain by beds of heavy clay, are underlain by beds of unconsolidated sandy clays, sands, and sandy materials.

Developed on the second bottoms, or terraces, along Alabama and Cahaba Rivers and some of the larger creeks are wide, continuous areas of Kalmia fine sandy loam; Kalmia loamy fine sand; Wickham loam; Wickham fine sandy loam; Cahaba fine sandy loam;

Cahaba fine sandy loam, mixed phase; Cahaba loamy sand; Amite fine sandy loam; Augusta fine sandy loam; Augusta silt loam; Augusta silt loam, mixed phase; and Leaf fine sandy loam. Many of these soils correspond in color and texture and somewhat in structure to the sandy soils on the uplands. The Amite corresponds in color to the Red Bay, the Cahaba to the Ruston, the Kalmia to the Norfolk, and the Leaf to the Susquehanna. The materials forming these soils have been washed largely from the uplands in this and other counties through which the streams flow and have been brought down and deposited by the streams during times of overflow.

Because the subsoils are dominantly friable fine sandy clays, practically all the soils in the sandy uplands and river terraces group are classed as fine sandy loams even though the surface soils are really loamy fine sands or loams. Most of these soils contain only a small amount of organic matter, as the yellow, light-gray, and red colors indicate. They range from slightly to strongly acid.

The soils in this group range in relief from smooth, broad, plateaulike areas to comparatively narrow, flat-topped ridges. They have the smoothest relief of any soils in the county except the soils occurring on the first bottoms. With the exception of the poorly drained phase of Norfolk fine sandy loam and the heavy subsoil of Susquehanna fine sandy loam, all of them possess good natural surface and internal drainage. These soils were at one time heavily forested, but most of the merchantable timber has been cut, and the present tree growth consists of longleaf, shortleaf, and rosemary pines, together with some sweetgum, black gum, hickory, oak, and dogwood.

Most of the soils in this group, on account of their sandy texture, open structure, and good drainage, warm early in the spring and are the first soils in the county on which agricultural operations are begun. The fine sandy clay subsoils are sufficiently heavy in texture to retain moisture and fertilizer and sufficiently permeable to allow free movement of the moisture in the surface soil and subsoil. They respond readily to the application of commercial fertilizer, the addition of barnyard manure, and the turning under of green leguminous crops. They are very easily tilled with light farm implements.

The soils of this group are considered good agricultural lands and are used for the production of a wide variety of crops. On them are produced much of the corn, practically all of the peanuts, and most of the cotton, garden vegetables, sweetpotatoes, sorgo, sugarcane, and fruits.

Ruston fine sandy loam.—The surface soil of Ruston fine sandy loam is grayish-brown loamy fine sand to a depth of about 6 or 8 inches, where it grades into reddish-brown friable fine sandy clay. This gradually becomes lighter in color and structure and at an average depth of about 50 inches grades into reddish-brown or yellowish-brown very compact loamy sand splotched or streaked with gray and yellow.

The depth of the surface soil of Ruston fine sandy loam is fairly uniform on the level areas but varies considerably on the slopes, where it may range from about 6 inches on the upper slopes to 20 inches near the base of the slopes. As mapped, this type includes small spots of Orangeburg and Norfolk fine sandy loams.

Ruston fine sandy loam occurs in close association with Orangeburg and Norfolk fine sandy loams in widely scattered areas throughout all parts except the prairie region. Some of the largest areas of this type are east of Tilden, in the vicinity of and north of Hardys Store, west of Soapstone, in the vicinity of Tyler, southeast of Protestant Grove Church, north of New Everdale, and southeast of Orrville. The relief ranges from almost flat and undulating to gently sloping. Both surface drainage and internal drainage are good.

Ruston fine sandy loam is one of the best soils of the sandy uplands. It lends itself readily to a diversified agriculture and to a definite system of crop rotation such as the following 2-year rotation, which is used on a large part of it: First year, cotton followed by vetch or Austrian Winter peas; second year, corn with or without soybeans. Approximately 90 to 95 percent of it is cultivated, with about 60 percent of the open land planted to cotton and the remainder planted to corn, with or without an interplanting of soybeans. All crop yields are good on this soil when proper cultural methods are used. Cotton yields range from one-half to 1 bale an acre when used in the afore-mentioned rotation system and with the application of from 400 to 600 pounds of a 6–8–4 [3] fertilizer. Corn, when used in the rotation, yields from 25 to 40 bushels an acre. An application of 150 to 225 pounds of nitrate of soda or its equivalent should be made as a side dressing if a cover crop is not turned under preceding the corn. Yields are much lower where improved cultural practices are not used.

Orangeburg fine sandy loam.—The surface soil of Orangeburg fine sandy loam, to a depth ranging from 5 to 8 inches, is grayish-brown loamy fine sand underlain, to a depth ranging from 12 to 18 inches, by brownish-yellow fine sandy loam. This grades through about 2 or 3 inches of yellowish-brown fine sandy loam into friable red fine sandy clay which is uniform in color. At a depth ranging from 50 to 70 inches, it grades into reddish-brown fine sandy clay mottled or streaked with shades of yellow, gray, and red. Strata of fine sand or loamy fine sand are generally present at this depth.

The largest areas of Orangeburg fine sandy loam are in the vicinities of Summerfield, Carlowville, and Pleasant Hill. A few smaller bodies are here and there throughout the central and southeastern parts.

Orangeburg fine sandy loam, though not extensive, is one of the most desirable general purpose soils in the county. Like the associated Ruston fine sandy loam, it is well adapted to a diversified agriculture and lends itself to a definite system of crop rotation except on the slopes and knolls where erosion has removed a large part of the surface soil. Cotton and oats are best suited to these eroded areas.

Practically the entire area of Orangeburg fine sandy loam has been cleared and is now under cultivation. By far the greater part of this soil is used for the production of cotton, and some corn, peas, beans, and minor crops for home use are produced in small patches here and there. The cropping system, fertilizer applications, and crop adaptations are the same as on Ruston fine sandy loam, and approximately the same yields are obtained.

[3] Percentages, respectively, of nitrogen, phosphoric acid, and potash.

Red Bay fine sandy loam.—The surface soil of Red Bay fine sandy loam, locally known as "red land" or "red sandy land", ranges in color from dark brown to reddish brown, and in depth from about 5 to 8 inches. It is mellow, friable fine sandy loam. An intergrade of 1 or 2 inches of dark reddish-brown loam or heavy fine sandy loam is usually between the surface soil and the red subsoil. The subsoil is red or dark-red slightly sticky but friable fine sandy clay which, at a depth of about 50 inches, gradually passes into lighter red and more friable fine sandy clay. This is underlain, at a depth ranging from about 7 to 10 feet, by yellowish-red loamy sand or sand and rounded quartz gravel.

The surface soil of Red Bay fine sandy loam is fairly uniform in color and texture, but the texture of the subsoil is lighter than typical in a few locations. On some of the slopes, or breaks, especially in the northern part of the county, in some spots erosion has removed part, or all, of the sandy surface covering and exposed the red clay subsoil. This soil is closely associated with Orangeburg and Ruston fine sandy loams and includes narrow borders, or margins, of these soils.

The most extensive areas of Red Bay fine sandy loam are in the northern part near Plantersville and north of Summerfield, and in the east-central part near Sardis and north of Tyler. This soil has an almost flat relief but is naturally well drained.

Red Bay fine sandy loam is considered by farmers to be one of the best soils for the production of cotton and gives good returns of this and of many other crops, especially under good soil management. All of it has been cleared, and at least 95 percent is now cultivated. Practically all of it is used for the production of cotton, and some corn is grown in small patches in low-lying positions or in the level areas where sheet erosion has not been active. The yield of cotton on farms operated by tenants, where a small amount of fertilizer is used, ranges from about one-fourth to more than one-half bale an acre; but on farms operated by owners who have grown winter cover crops of vetch, or peas, or who use from 400 to 600 pounds of high-grade fertilizers analyzing 6-8-4, the yields range from one-half to more than 1 bale an acre. Corn produces about 10 to 35 bushels an acre, the higher yields following a winter cover crop or the application of nitrate of soda. Lespedeza, as a hay and pasture crop in a cotton rotation, has been successful on this soil. The lespedeza is grown for 2 or 3 years followed by 2 to 4 years of cotton. Some pecan and peach orchards are located on this soil. The peaches are of good color and excellent flavor.

Blakely loam.—Blakely loam is a dark reddish-brown or dark chocolate-colored soil in the Akron and Red Bay areas. It occupies a slightly lower lying position than these associated soils and in many places has received an accumulation of material from them. The surface soil, to a depth of 8 or 10 inches, is chocolate-brown loam or clay loam. This grades into a dark-brown or reddish-brown clay loam subsoil containing a large amount of organic matter. Brown and dark-gray mottlings are present at a depth ranging from 25 to 35 inches, but the subsoil is dominantly brown to a depth between 45 and 50 inches, where gray clay, mottled with brown and yellow, is present.

Included with this soil are a number of small sinks and poorly drained areas too small to be shown on the map. Many of them are planted to sorgo and sugarcane, which give fair yields.

Blakely loam occurs as small areas comprising only 448 acres. Most of these areas are in the northern part north of Selma.

This soil has a deep surface soil, occupies level areas or slight depressions, is not subject to erosion, is very retentive of moisture, has a high content of organic matter, and is particularly well adapted to the production of corn and hay. Cotton tends to produce so much vegetation that the bolls and squares are shaded. This condition allows boll weevils to do considerable damage. Probably 80 percent of the area is planted to corn, which yields from 25 to 50 bushels an acre without fertilization. Cotton yields range from one-half to 1 bale an acre without fertilization. Sugarcane, sorgo, *Sesbania*, benne, partridge-peas, soybeans, peas, peanuts, oats, Johnson grass, and various other plants are well adapted to this soil.

Akron loam.—Akron loam is similar in color to Red Bay fine sandy loam but differs from it in the texture of the topsoil and in having a heavy compact subsoil. The surface soil ranges in depth from about 3 to 6 inches and is reddish-brown mellow loam. A sharp line usually marks the contact between the surface soil and the subsoil. The subsoil is dark-red heavy compact clay or fine sandy clay, of uniform color to a depth ranging from 50 to 70 inches, where it gradually becomes slightly lighter in color and structure and is mottled with yellow. At a depth ranging from about 100 to 150 inches this grades into reddish-brown and yellow clay, which may be interstratified with micaceous loamy fine sand. The subsoil is slightly sticky and plastic when wet and tough and brittle when dry. It breaks into a coarse cloddy structure when dry but pulverizes easily when moist.

Included with Akron loam are areas of Akron fine sandy loam. The surface soil seldom exceeds 8 inches in thickness and is brown. Over most of the type the subsoil is reached by the plow, and from many spots on the slopes much of the surface soil has been removed by erosion and the red subsoil exposed, giving a clay loam or clay surface soil.

Akron loam is confined to large irregularly shaped areas in the northern part. The largest areas lie about 5 miles north of Selma and southeast and south of Summerfield. The land occupies an elevation slightly higher than the prairie soils and lower than the lighter textured soils in the extreme northern part of the county. The relief ranges from almost level to gently sloping.

At least 95 percent of this soil is cleared and cultivated. Like Red Bay fine sandy loam it is retentive of moisture, responds well to fertilizers, and can be easily built up and maintained in a high state of productivity. Probably 90 percent of the cultivated area is planted to cotton, to which the soil is best adapted, with some corn and hay planted in the low-lying positions and where sheet erosion has not been serious. Crop yields, methods of soil improvement, and fertilizer requirements are about the same as on Red Bay fine sandy loam. Several small pecan and peach orchards are located on Akron loam. Alfalfa is grown successfully in the northern part of the State on a soil of similar color and structure and doubtless can be

produced profitably on this soil by the addition of lime, which can be obtained from Sumter clay or Selma chalk within easy hauling distance.

Norfolk fine sandy loam.—The surface soil of Norfolk fine sandy loam is light-gray fine sandy loam or loamy fine sand to a depth, normally, of from 5 to 8 inches. Below this is pale-yellow or grayish-yellow fine sandy loam extending to a depth ranging from 10 to 15 inches. The subsoil is uniformly yellow friable fine sandy clay to a depth ranging from 30 to 40 inches. This passes into slightly compact and brittle fine sandy clay streaked with gray, yellow, and red. The depth of the surface soil may range in some locations from 8 or 10 inches on the level areas to as much as 24 inches in other places, especially on the lower gentle slopes.

Included with this type are several small areas of Marlboro loam or very fine sandy loam, which occur mainly east and south of Orrville. On account of its small extent this soil is included with Norfolk fine sandy loam. It has a level relief. The surface soil is grayish-brown or brown loam or very fine sandy loam, which has an average depth of about 6 inches. This passes abruptly into a subsoil which is somewhat heavier and is deeper yellow than that of Norfolk fine sandy loam. The subsoil of this type becomes mottled with gray at a depth of about 30 inches, the lighter color becoming more prominent with depth. The soil is especially adapted to the production of cotton but is not so well adapted to the production of corn as is Norfolk fine sandy loam.

Norfolk fine sandy loam occurs mainly throughout the central and eastern parts. It is developed in large areas in the eastern part in the vicinities of Tyler, Casey, Sardis, and Mount Olivet Church. In the vicinity of and south of Orrville are many irregularly shaped areas.

It is an important agricultural soil. Like the associated Ruston and Orangeburg soils, it is well adapted to a diversified system of farming and to crop rotation. It is an easy soil to handle, responds well to fertilizers, contains a good moisture supply, and gives this up readily to growing crops. Its surface features are very favorable for the use of improved farm machinery. It is well adapted to practically all the crops grown in this section.

About 90 percent of the type is now under cultivation. Probably 65 percent is used for the production of cotton and the larger part of the remainder for corn and hay crops. The yields of these crops vary considerably on this soil. On the tenant farms, yields of cotton range from about one-fourth to one-half bale an acre, and of corn 8 to 20 bushels. On the other hand, some of the better farmers are using a 2-year rotation of first year, cotton followed by vetch, second year, corn, which may or may not be interplanted with soybeans. The cotton yields, under this method and when fertilized with from 400 to 600 pounds of a 6–8–4 fertilizer range from one-half to more than 1 bale an acre, and corn yields range from 20 to 40 bushels an acre. Yields of oats range from 20 to 40 bushels. The oats are sown in the fall and are usually top-dressed with from 100 to 200 pounds of nitrate of soda in the early spring. Sugarcane and vegetables, which are grown only for home use, give good yields on this soil. Peanuts are grown for home use and for sale. This soil is

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considered one of the best soils for truck crops in the Coastal Plain and is used extensively for the production of such crops in parts of southern Alabama as well as in other States.

Norfolk fine sandy loam, poorly drained phase.—Both surface soil and subsoil of Norfolk fine sandy loam, poorly drained phase, are lighter in color than those of the typical soil and are much more mottled, especially in the lower part. The surface soil, to a depth ranging from 3 to 5 inches, is pale-gray fine sandy loam. This grades through about 3 inches of yellowish-gray fine sandy clay into pale grayish-yellow fine sandy clay which contains some gray, brown, and yellow mottlings at depths ranging from 12 to 18 inches. Gray compact clay or fine heavy sandy clay, highly mottled with yellow and brown, is present at a depth ranging from 20 to 24 inches.

This soil occupies small areas in close association with Norfolk fine sandy loam. Some of the largest are in the extreme eastern portion of the county, and other considerable areas lie between Big Swamp Creek and Alabama River southeast of Orrville.

This land occupies a flatter and lower lying position than Norfolk fine sandy loam and consequently is more poorly drained.

About 50 percent of the soil of this phase is cleared, but only about 10 percent is farmed. The remainder is in pasture and woods. Corn and sorgo are the principal crops grown. Corn produces from 5 to 12 bushels and sorgo from 40 to 80 gallons of sirup an acre. The soil is best adapted for the growing of sorgo or soybeans. Carpet grass and lespedeza furnish good grazing on the pastured areas. Broomsedge is a pest in the pastures on this soil. The forested areas support, in addition to the ordinary growth on the sandy soils, a growth of French mulberries, blackberries, and gallberries, producing a large amount of food for quail. *Sesbania* and benne may be grown as supplemental feeds.

Norfolk loamy sand.—Norfolk loamy sand is closely associated with Norfolk fine sandy loam and Ruston fine sandy loam, but it differs principally from the former in the amount of sand contained in the subsoil. The surface soil to a depth ranging from 6 to 10 inches, is gray sand or light loamy sand. This grades into grayish-yellow loamy sand that extends to a depth ranging from 32 to 40 inches, where it generally grades into yellow fine sandy loam.

Included with Norfolk loamy sand are some bodies of Ruston loamy sand, which differs from Norfolk loamy sand in that it has a light-brown loamy sand subsoil. The largest bodies lie north of Minter and north of Tilden.

Norfolk loamy sand is scattered over all the sandy upland part of the county. The largest bodies are developed in the southern part in the vicinity of St. Pauls Church, north of Tilden, and in a number of areas in the southwestern part lying from 1 to 2 miles from Chilatchee Creek. A fair-sized area is along the Alabama River southeast of Orrville.

Probably 50 percent of this soil is open land, but not more than 15 percent is cultivated annually. The forested areas support a growth of old-field pine, post oak, and blackjack oak. Cotton, corn, peanuts, watermelons, and garden crops are the principal crops grown. Pursley, or Mexican-clover, a quail feed, is naturally adapted to this soil. It is best adapted to peanuts and watermelons, although the larger

cultivated areas are used for cotton and corn, which are planted in about equal proportions. The yields of each of these crops are low, the cotton yields ranging from one-fifth to one-third of a bale an acre when fertilized with an application ranging from 100 to 200 pounds of a 3–8–5 fertilizer, and corn 5 to 15 bushels an acre with no fertilization. To farm this soil successfully, green cover crops, such as vetch, Austrian Winter peas, or crotalaria, should be turned under. These not only supply nitrogen as a plant nutrient but help conserve moisture. By the use of one of the cover crops or by liberal applications of a 6–8–4 fertilizer to cotton the yields should be increased to more than one-half bale an acre. Corn yields should increase to 20 or 25 bushels an acre when a cover crop is used or when side dressed with from 150 to 225 pounds of nitrate of soda or its equivalent without the use of a cover crop.

Susquehanna fine sandy loam.—The surface soil of Susquehanna fine sandy loam is variable in texture and in depth because both sheet erosion and gully erosion have been very active as the result of its rolling relief and of a tight heavy subsoil that does not allow rapid penetration of water. In many places the surface soil is completely removed and areas of tight heavy red clay are exposed. These areas are either idle or planted to cotton or oats. In other places, particularly at the bases of slopes or in small swales, the soil has been accumulating. These areas are productive, and in them corn and hay are grown. In the virgin state, this soil has a surface covering of 2 or 3 inches of gray loamy fine sand underlain by grayish-yellow loamy fine sand or fine sandy loam that extends to a depth ranging from 5 to 8 inches, where it rests on a brownish-red sticky plastic clay subsoil which contains some gray and yellow mottlings. This grades at a depth ranging from 15 to 20 inches into mottled red, yellow, and gray plastic clay. The gray increases with depth until blue-gray clay or micaceous clay is reached at a depth ranging from 50 to 80 inches. The subsoil is very acid in reaction.

South of Safford and in a few other locations are small bodies of Cuthbert fine sandy loam which, because of their small acreage and because of the similarity of the two types in agricultural value, are included with this type. The subsoil of Cuthbert fine sandy loam is tougher and more compact than that of Susquehanna fine sandy loam. Small spots of Ruston fine sandy loam on the hill crests and some small areas of Oktibbeha fine sandy loam are also included. These areas are not extensive enough to be shown as a type. This land differs from Susquehanna fine sandy loam largely in that calcareous material underlies the subsoil at a depth ranging from 2 to 6 feet.

Susquehanna fine sandy loam occupies rather large areas in the southeastern part of the county. Some of the largest areas are east of Morgan Hill, in the vicinity of Little Rock Church, southeast of St. Stephens School, south of Polk, and south of Protestant Grove Church. Smaller areas are in the prairie region in the western part.

Susquehanna fine sandy loam is of but little agricultural importance. Only about 10 percent is cleared and cultivated, and that is in small patches on the smoother areas. Cotton and corn are the principal crops. The soil is farmed mainly by Negro tenants who use little or no fertilizers, and the yields are naturally low. The

tree growth on the wooded areas consists of old-field and rosemary pines, together with a mixture of oaks, hickory, and other hardwoods. This soil, on account of its generally rolling surface, can be used most economically for forestry and pasture. Bermuda grass and lespedeza are the grasses best adapted to it, although carpet grass does well in the low-lying positions.

Kalmia fine sandy loam.—Kalmia fine sandy loam is similar in color and structure of both surface soil and subsoil to Norfolk fine sandy loam of the uplands. It occurs in a terrace position and occupies level to undulating areas. Most of it is well drained.

The surface soil, to a depth of 6 or 7 inches, is gray loamy fine sand underlain to a depth ranging from 15 to 20 inches by grayish-yellow loamy fine sand or light fine sandy loam. This grades into yellow friable fine sandy clay, which continues to a depth of 30 inches where it becomes slightly mottled with gray and rust brown. At a depth ranging from 40 to 60 inches mottled yellow, gray, brown, and red heavy fine sandy clay is reached. Below this are beds of sand and clay.

The soil of this type varies considerably from place to place. In the more poorly drained situations the surface soil is lighter gray or dingy gray, and the subsoil is of a light color and more mottled than in the higher or better drained areas. In some locations the lower subsoil layer is heavier than that of the typical soil and approaches that of Leaf fine sandy loam. These heavy-subsoil areas are less well drained than the average of the type, the downward movement of water being retarded by the stiff compact sandy clay or silty clay subsoil. In many places quantities of rounded quartz gravel are on the surface and in the subsoil, but such material does not interfere materially with tillage. A few small strips, bordering the higher lying limy soils, have received washings of material from these soils and have thus been made less acid. With these exceptions, practically all the soil of this type is acid.

The largest bodies of Kalmia fine sandy loam are along Big Swamp Creek southeast of Orrville, and other bodies are along Alabama River, Mulberry River, and the large creeks that flow through the sandy uplands.

At least 90 percent of the soil of this type is cleared and under cultivation. Of this amount about 80 percent is used for the production of cotton, and the remainder is planted to corn, sorgo, sugarcane, peas, beans, and peanuts. Under present cultural methods, yields of most of these crops are approximately the same as on Norfolk fine sandy loam. Kalmia fine sandy loam produces an excellent quality of sirup. The methods of improving, fertilizer applications recommended, and yields are approximately the same as for Norfolk fine sandy loam.

Kalmia loamy fine sand.—Kalmia loamy fine sand has more sand in the subsoil and therefore is more porous, more subject to leaching and to the loss of plant nutrients, and less retentive of moisture than Kalmia fine sandy loam, with which it is closely associated. To a depth ranging from 6 to 9 inches, the surface soil of Kalmia loamy fine sand is gray fine sand or light loamy fine sand, underlain by grayish-yellow loamy fine sand to a depth ranging from 3 to 5 feet, where it grades into gray mottled sandy clay.

The largest bodies of this soil are southwest of Orrville along Chilatchee Creek. Other small areas lie here and there along Alabama River and many of the larger creeks. The greater part of this type has been cleared, but only about 30 percent is now cultivated, the remainder being used for pasture or lying idle. Bermuda grass is the principal pasture grass. Cotton occupies the largest acreage; a considerable acreage is devoted to the production of peas, peanuts, and beans; and some corn is grown. The yields of crops are low, especially where only small amounts of fertilizer are used. The yields of peanuts, watermelons, peas, and beans are not so high as on soils of the fine sandy loam types. The soil is probably best adapted to peanuts and watermelons, but the other crops can be grown economically.

As the soil is very porous and subject to leaching, its greatest needs are moisture conservation and the addition of plant nutrients. Green cover crops, such as vetch, Austrian Winter peas, or crotalaria, therefore, should be turned under each year or in alternate years. By growing and turning under these cover crops or by using from 300 to 600 pounds of 6–8–4 fertilizer, the cotton yield can be increased to more than one-half bale an acre. The corn yield can be increased to 15 to 30 bushels an acre without fertilizer when cover crops are turned under.

Wickham loam.—The surface soil of Wickham loam, to a depth ranging from 3 to 5 inches, is grayish-brown or brown loam or clay loam. It is variable in texture, ranging from silt loam in the lower situations, where soils of the Augusta series are approached, to brown fine sandy loam in other locations. Red spots occur on some of the knolls where erosion has removed the surface covering of the loam soil exposing the clay subsoil. The subsoil, to a depth ranging from 24 to 30 inches, is tight compact reddish-brown clay underlain by brownish-gray compact clay highly mottled with brown, yellow, and gray.

The largest bodies of this soil are near Kings Landing, and other bodies are here and there on the terraces of Alabama River. Included with this soil are many small areas of Augusta silt loam and Wickham fine sandy loam.

Like the associated soils of this series, practically the entire area of Wickham loam has been cleared. About 70 percent is at present used for farm crops and the remainder for pasture. This soil is naturally droughty and is best adapted to cotton, winter cover crops, and oats. It is subject to overflow during abnormally high rainfall during the winter months, consequently the growth of vetch or Austrian Winter peas is hazardous. Cowpeas can be grown after oats, provided a rainy season comes about the time the oats are harvested. Cotton yields range from one-fifth to one-half bale an acre. This soil can be improved by deep plowing and the use of summer legumes. One of the best methods of improving it is to grow lespedeza and use the land as pasture for 2 or 3 years and then put it back into cotton from 2 to 4 years. Lespedeza is native to this soil and generally does not require planting. Oat yields on it are very good. Small patches of corn are planted, generally in the lower situations or on the small included spots of Augusta silt loam or where the surface soil has been accumulating.

Wickham fine sandy loam.—Wickham fine sandy loam occupies a terrace position. The material from which this soil has been formed was washed from the red hills of eastern Alabama and deposited by Alabama River before this stream reached its present channel. The surface soil to a depth ranging from 5 to 7 inches is grayish-brown fine sandy loam or loamy fine sand. This grades abruptly into compact reddish-brown clay which extends to a depth ranging from 30 to 40 inches, where it becomes mottled with yellow and some gray. This extends to a depth ranging from 45 to 50 inches, where it becomes more friable, grading into highly micaceous yellow fine sandy loam or loamy fine sand. This is underlain at a depth ranging from 60 to 80 inches by a mixture of small rounded quartz gravel and yellow sand.

On the crests of the low ridges and in better drained situations the surface soil shows more brown and the subsoil a deeper red than on the slopes where the lower lying soils of the Augusta and Leaf series are approached. South of New Everdale and in a few other locations along Alabama River, there are small areas in which the surface soil averages deeper than that of the typical soil. It is here gray loamy fine sand underlain by yellow or brownish-yellow loamy fine sand ranging in depth from about 10 to 20 inches. These spots are not quite so productive as the average soil of the type. Small strips of soils of the Augusta and Leaf series or gradations in these soils are included with this type.

Wickham fine sandy loam occupies a considerable acreage on the river terraces and is a good soil for the production of cotton. Practically all of it is cleared and cultivated. About 85 percent is used for the production of cotton, 10 percent for corn, and the remainder for cowpeas, soybeans, peanuts, sorgo, potatoes, and other minor crops. Several large pecan orchards have been planted on this soil near Cahaba. The soil warms early in the spring, responds readily to fertilizer, and is easy to cultivate. The yields of cotton range from one-fifth to more than one-half bale an acre, the higher yields depending on seasonal conditions, the amount of fertilizer applied, and the preparation of the seedbed. Cotton is usually fertilized with an application ranging from 150 to 300 pounds of a 3–8–5 or 4–8–4 mixture, but more profitable returns are obtained with a larger application of a 6–8–4 fertilizer. Corn is not generally fertilized, but some farmers obtain greatly increased yields by a side application ranging from 100 to 150 pounds of nitrate of soda when the corn is about 2 feet high. As this soil tends to be droughty, the use of winter cover crops or barnyard manure and deep plowing are necessary for the economical production of corn. The yields of cowpeas, soybeans, peanuts, and other crops are very good. The farming system on this soil should be built around cotton, oats, and peas.

Cahaba fine sandy loam.—Cahaba fine sandy loam is very similar to Ruston fine sandy loam, but it occurs on stream terraces whereas the Ruston soil occurs on the uplands. To a depth of about 6 inches, the surface soil is grayish-brown loamy fine sand underlain to a depth ranging from 12 to 15 inches by yellowish-brown friable fine sandy loam. This grades into brown or reddish-brown friable fine sandy clay which becomes slightly mottled with yellow at a depth ranging from 40 to 50 inches. This continues to a depth ranging from 5 to 7 feet where it grades into red and yellow loamy fine sand.

The surface soil varies in thickness from place to place, ranging from about 6 to 16 inches. The areas having the shallower surface soils are on the slight knolls and breaks where the surface soils have been partly removed through erosion. Spots of reddish-brown loam are also included.

Cahaba fine sandy loam occurs in small bodies here and there throughout the river and creek terraces. This is one of the good agricultural soils of the county. All of it is now in cultivation to general farm crops. Cotton occupies by far the greatest acreage, and some corn, beans, peas, peanuts, and other crops are produced. This soil warms quickly and responds readily to fertilizers and green manures. It should receive the same cultural treatments as Ruston fine sandy loam and produce comparable yields. The yields of most crops average slightly higher than on Orangeburg fine sandy loam, probably because of better moisture conditions due to a slightly larger amount of fine materials in the surface soil.

Cahaba fine sandy loam, mixed phase.—Cahaba fine sandy loam, mixed phase, occupies long narrow low ridges paralleled by narrow shallow drainageways. The soil is variable in color, texture, and structure. On the crests of the ridges, it is Cahaba fine sandy loam or Wickham fine sandy loam, silt loam, or loam. As the drainageways are approached, these soils grade into soils of the Augusta series which range in texture from silt loam to fine sandy loam. Cahaba fine sandy loam, mixed phase, also includes soils of the Kalmia and Leaf series and similar soils. These different soils are in belts too narrow to be separated on the map.

The mixed phase includes a few small areas of Cahaba silt loam, the surface soil of which is brown silt loam and the subsoil mellow and friable reddish-yellow clay loam. Most of these areas are cleared and cultivated and produce good yields of corn, cowpeas, and hay.

Probably not more than 10 percent of Cahaba fine sandy loam, mixed phase, is cleared and cultivated. The greater part of the remainder is used for grassland and woodland pasture. Carpet grass, Dallis grass, and lespedeza are the principal pasture plants. *Sesbania*, benne, and partridge-peas can be grown as bird feed. The forest growth is that common to the sandy lands of this section. The cultivated areas are used for general farm crops, and fair to good yields are obtained. Cotton is grown in the higher lying positions, and corn and sorgo are grown in the lower positions.

Cahaba loamy sand.—Cahaba loamy sand occurs in association with other soils of the Cahaba series and with soils of the Wickham and Augusta series on the terraces of Alabama River and the larger creeks. The surface soil is brown loamy sand or loamy fine sand to a depth ranging from 8 to 10 inches. This passes gradually into brown or light reddish-brown loamy sand which extends to a depth ranging from 3 to 5 feet, where it is underlain by light fine sandy loam.

Included with Cahaba loamy sand are small bodies of Amite loamy fine sand. This soil has a brown loamy fine sand surface soil and a reddish-brown loamy fine sand subsoil. It contains a little more clay and fine sand particles than Cahaba loamy sand and, therefore, gives slightly better yields. Practically all of it is planted to cot-

ton. The principal areas are east of Selma, and small bodies lie along Alabama River.

The largest areas of Cahaba loamy sand are at and east of Selma and near Portland, and small isolated bodies occur here and there throughout the terraces.

About 95 percent of the soil of this type has been cleared, of which about 40 percent is cultivated, chiefly to cotton, corn, velvetbeans, and peanuts, all of which produce fair yields, depending on the supply of humus in the soil and the amount and kind of fertilizer applied. It can be handled with light farm tools and cultivated under a wide range of moisture conditions, even immediately after a rain. It warms early in the spring and is well suited to early truck crops and garden vegetables. Large applications of manure or cover crops turned under are necessary to the successful farming of this soil. Organic matter helps conserve the moisture and also supplies nitrogen for plant growth. This soil is best adapted to the production of peanuts and watermelons. Up to two-thirds of a bale of cotton or 25 bushels of corn an acre can be produced, however, by incorporating organic matter in the soil and by using, on cotton, from 400 to 600 pounds of a 6-8-4 fertilizer; corn which follows a winter cover crop requires no fertilizer.

Amite fine sandy loam.—Amite fine sandy loam is similar in color, texture, and structure to Red Bay fine sandy loam of the uplands. It is differentiated from Red Bay fine sandy loam because it occupies a terrace position lying from 50 to 150 or more feet below the uplands. The soil is dark-brown mellow fine sandy loam with an average depth of about 7 inches. This is underlain by dark reddish-brown heavy fine sandy loam that rests on dark-red slightly sticky fine sandy clay at a depth of about 18 inches. The subsoil passes gradually, at a depth ranging from 40 to 50 inches, into yellowish-red fine sandy loam, which grades into yellow fine sand or fine sand and gravel at a depth ranging from 4 to 8 feet. This fine sand and gravel substratum gives thorough aeration and drainage to the soil.

The soil varies slightly, from place to place, in color and in the thickness of the soil covering, which ranges from 6 to 18 inches. In some locations, the subsoil is somewhat heavy and plastic, and in other places the type includes small spots of Amite loamy fine sand.

The largest bodies of Amite fine sandy loam are east of Selma and in the river bend north of Portland. Smaller areas lie here and there along Alabama River. All of this type is cleared and cultivated. Although not extensive, it is an important agricultural soil. It is considered the best soil on the river terraces for the production of cotton, and is also adapted to the general farm crops of the section. The soil warms and can be worked early in the spring, responds readily to good treatment, and is practically free from erosion. The land is easily worked, is very retentive of moisture, and can be handled under a fairly wide range of moisture conditions. The largest acreage of this soil is devoted to cotton, and some corn, oats, cowpeas, sweetpotatoes, beans, and peanuts are grown. The yields of these crops, the fertilizer requirements, and the methods of improving it are similar to those on Red Bay fine sandy loam.

Augusta fine sandy loam.—Augusta fine sandy loam occurs on the terraces of Alabama River in association with soils of the Wickham series. It differs from Wickham fine sandy loam in occupying a lower position, in being less well drained, and in having a lighter colored subsoil. The surface soil, from 4 to 6 inches thick, is brownish-gray or light-yellow somewhat compacted but friable silty clay which, at a depth ranging from 16 to 20 inches, becomes somewhat lighter in color and mottled with shades of gray, brown, and red. This grades into pale grayish-yellow compact clay, highly mottled with rust brown and light gray.

In the poorly drained situations, the soil is lighter in color and mottled throughout with rust brown, gray, and yellow. Small buckshotlike iron accretions are found on the surface and throughout the soil profile in the greater part of this variation, especially in the flatter areas. Practically all of the areas of this soil would be improved by ditching, as drainage is slow on all of it.

The surface soil is variable in texture, ranging from fine sandy loam to silt loam. It includes small spots of, or gradations toward, soils of the Wickham and Leaf series. The largest areas of Augusta fine sandy loam lie east of Selma and south of Bethel Church, and smaller bodies occur throughout the second bottoms along Alabama River.

Augusta fine sandy loam suffers from extremes of wetness and dryness. The surface soil is very wet during the winter and early spring and, therefore, warms late. The subsoil is compact, especially in the lower part, and retards moisture movement and root penetration, and plants suffer from lack of moisture during dry seasons.

About 15 percent of this type is cultivated, and the remainder is used for grass and woodland pasture. A large part of this soil can be brought into cultivation by the use of deep drainage ditches, and as part of the uplands are abandoned as the result of erosion, more of this soil will be cultivated. The tree growth consists of a variety of oaks, hickory, sweetgum, and black gum, together with some shortleaf pine. Augusta fine sandy loam is best adapted to pasture consisting of Dallis grass, lespedeza, and Bermuda grass. Cotton and corn are the principal crops grown. Of the cultivated crops, cowpeas, sorgo, and oats do best, but oats must be grown on the best drained areas.

As this soil occupies level or slightly depressed areas and is free from erosion, it naturally has a higher content of organic matter than most of the other soils of the county. The crop production, therefore, is dependent in large measure on cultural management as well as on fertilizers. Probably the best method of improving this soil is by growing and turning under crotalaria, a summer-growing legume, as winter legumes are subject to drowning. The crotalaria should be turned under in the fall, or the land should be bedded on the crotalaria. Bedding in the fall is perhaps the best method of handling, as this allows the soil to warm earlier in the spring, which is very necessary for the production of cotton under boll-weevil conditions. Liberal applications of superphosphate and potash are necessary in addition to the crotalaria. Nitrate of soda must also be used unless a cover crop is turned under.

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Augusta silt loam.—The surface soil of Augusta silt loam, to a depth of 6 inches, is mellow grayish-brown silt loam mottled with rust brown. The subsoil, to a depth ranging from 18 to 24 inches, is pale-yellow moderately compact but friable micaceous silty clay, mottled with yellowish brown. This passes into yellow compact brittle micaceous silty clay, mottled dull red, grayish yellow, and dark brown. The material of this layer has a fine cloddy structure and does not break up into granules so readily as the overlying layer. Below a depth ranging from 36 to 48 inches, the material is more compact, moderately plastic, and yellowish brown streaked with gray. The darker coloration in the surface soil and subsoil is contributed by soft brown and black iron accretions. These accretions are very abundant and are most numerous in the more poorly drained areas.

Augusta silt loam has a flat surface or occurs in slight depressions which lie slightly lower than the adjacent soils. On account of the nearly level surface, the run-off of rain water is slow. The surface soil and the upper part of the subsoil absorb and retain water readily, but the compact lower part of the subsoil hinders the downward movement of moisture. Here the material was found to be lumpy and dry even after several weeks of thorough saturation of the surface soil. Some areas of this soil are overflowed during periods of extremely high water.

This soil is developed on the terraces of Alabama River. The largest areas are in the eastern part, but many small areas lie elsewhere on the terraces.

Probably 80 percent of the land is cleared, but only about 10 percent is in cultivation, the remainder being in grass and woodland pasture. Like Augusta fine sandy loam, Augusta silt loam may be brought into cultivation in increasing acreages by the use of deep drainage ditches as the upland areas are abandoned. The wooded areas support a growth of oak, gum, elm, maple, haw, and pine. Cotton, corn, cowpeas, and oats are the principal crops. Yields of corn range from 10 to 25 bushels an acre, cotton one-fifth to one-half bale, and oats 20 to 30 bushels. Cowpeas produce one-third to 1 ton of hay an acre. Bermuda grass, lespedeza, crabgrass, water grass, and carpet grass furnish good pasturage. Cultural management and fertilizer recommendations for this soil are similar to those for Augusta fine sandy loam.

Augusta silt loam, mixed phase.—The mixed phase of Augusta silt loam is mainly southwest of Kings Landing in the south-central part of the county. The surface is flat with here and there slight swells that give better relief and have developed small spots of Wickham loam, Wickham silt loam, and Augusta fine sandy loam. The flat areas, which predominate, range in texture from clay to silty clay loam and silt loam. Also included are swales containing narrow strips of Myatt fine sandy loam and Myatt silt loam. This phase is subject to inundation during flood stages of Alabama River.

Probably less than 5 percent of the soil of this phase is cultivated. The cultivated areas are on the slightly higher elevations of included Wickham loam and Augusta fine sandy loam. The phase is best suited to pasture grasses and woodland pasture. Carpet grass and lespedeza are the principal grasses, but Bermuda grass and Dallis

grass can be grown successfully. The cultural methods recommended for Augusta fine sandy loam are applicable to this soil. The land supports a mixed growth of hardwoods, together with some old-field pine.

Leaf fine sandy loam.—The surface soil of Leaf fine sandy loam, to a depth of about 3 inches, is gray fine sandy loam, very fine sandy loam, or loamy fine sand. Beneath this and extending to an average depth of 8 inches is pale-yellow or grayish-yellow fine sandy loam or loamy fine sand. This is underlain to a depth of about 18 inches by pale-yellow heavy fine sandy loam which shows some gray mottlings, especially in the poorly drained areas. The subsoil is grayish-yellow heavy plastic clay mottled with red, gray, and yellow and carrying considerable fine sand. The color mottlings vary from place to place. The subsoil varies somewhat in structure in different parts of the county. Where the material is washed mainly from soils of the Susquehanna series or has been influenced by the materials brought from them or from the heavy clays of the prairies, the subsoil is much heavier than where the materials have been washed from the lighter textured soils.

The largest bodies of Leaf fine sandy loam are developed on the second bottoms, or terraces, along Boguechitto, Chilatchee, and Cedar Creeks. A small area 2½ miles west of Selma on the Orrville road has a surface soil ranging from 20 to 24 inches in thickness. The typical soil occurs to a greater or less extent along many creeks, especially those flowing through or receiving material from heavy soils. It represents material that was deposited by these streams during periods of overflow when the streams flowed at higher levels. Practically all of it lies above ordinary overflow.

Leaf fine sandy loam is fairly well suited to the staple crops, corn, cotton, peas, beans, peanuts, and sorgo. About 50 percent of the land is cleared and cultivated. Cotton is the principal crop and occupies about 90 percent of the cultivated area. The yields range from one-fourth to two-fifths of a bale an acre, depending on seasonal conditions, methods of handling the soil, kind and amount of fertilizers, and extent of damage from boll weevils. Corn is the next crop of importance. The yields range from 8 to 20 bushels an acre, with an average of 12 bushels. It is seldom fertilized. Sugarcane and sorgo give fair returns on soil of this type. They are usually planted in the more poorly drained tillable areas. The yield of sirup ranges from 50 to 125 gallons an acre. Sweetpotatoes and garden truck crops do fairly well on the better drained areas.

SOILS OF THE CLAY UPLANDS AND PRAIRIES

The group of soils of the clay uplands and prairies comprises the Black Belt, or prairie, of Alabama and Mississippi. It is composed of Houston clay and its eroded phase, Sumter clay and its mixed phase, Bell clay and its poorly drained phase, Catalpa clay, Oktibbeha clay, Vaiden clay, Vaiden fine sandy loam, and Eutaw clay. They are in the western and northwestern parts of the county and occupy 22.8 percent of the total area. They are markedly different in color, texture, and structure from the soils of the sandy uplands and river terraces previously described. The underlying material is Rip-

ley marl, Selma chalk, or soft limestone, as contrasted with the sandy clay or clay materials underlying the other soils of the county. The color ranges from the light gray or gray of the Sumter to the black or dark gray of the Houston, through the brown and red of the Oktibbeha, the yellow of the Vaiden, and the brownish gray of the Eutaw. This color contrast is conspicuous over large areas of freshly plowed land. These soils are nearly level, undulating, or gently rolling and lie mainly at about the same elevation as the low broad smooth plateaulike areas in the central part.

All of the soils of this group are heavy, intractable clays which require heavy equipment for proper breaking and seed preparation. They can best be handled under a narrow range of moisture conditions. If plowed too wet the soils puddle and bake on drying; if plowed in a dry condition, except in the Sumter and that part of the Houston that contains lime in the surface, they break into heavy clods that are later pulverized with difficulty. These two soils, the Sumter and that part of the Houston that contains lime in the surface soil, break down to a coarse granular structure.

The diversity in color, content of organic matter, degree of acidity, and chemical composition in the different soil types is considerable, because of the different sources of origin and the different degrees of soil development. These differences influence the agricultural value and use of the different types and also determine the character of the natural vegetation.

The general characteristics of these soils can best be described by grouping the soils into (1) calcareous soils and (2) noncalcareous, or forest, soils.

The Houston, Sumter, Bell, and Catalpa soils are the calcareous prairie soils. The Catalpa, however, is not everywhere alkaline in reaction. These soils, except the Catalpa, have never, so far as is known, supported a tree growth worthy of note but have been covered with grass for a long time. This grass covering and the consequent accumulation of roots, together with the calcareous character of the soils, account for the large amount of organic matter in the surface soils of the Houston and Bell clays and is responsible for their dark-gray or black color. The light color of Sumter clay is due to the fact that erosion has kept pace with soil development, not allowing a deep soil to form. The Houston soil is calcareous in the surface soil and upper subsoil layer, neutral to slightly acid in the lower subsoil layer, and very calcareous in the underlying material, but the Sumter is calcareous from the surface down. The Bell may be acid at a depth of 3 feet. The internal drainage of all these soils is slow.

These calcareous soils support a markedly different agriculture from that of the other soils in the county. They are considered the best soils for the production of grass and clover and are predominantly in hay crops or devoted to grazing purposes, although a part is devoted to corn and a very small acreage to cotton. Johnson grass is the principal hay crop grown on these soils, and Dallis grass and black medic are important pasture plants. These are discussed in detail under each soil type.

The noncalcareous, or forest, soils in the prairie section include the Oktibbeha, Vaiden, and Eutaw. These have light-colored sur-

face soils ranging from gray to brown and red and heavy plastic clay subsoils mottled red, yellow, and gray to mottled light gray and rust brown. Calcareous material lies from 3 to 10 feet beneath the surface. Old-field pine and some rosemary pine constitute the major tree growth on the Oktibbeha and Vaiden soils, and these pines, post oak, and blackjack oak constitute the major tree growth on Eutaw clay. This group is larger in extent than the group of calcareous soils. The Oktibbeha and Vaiden soils occur on long smooth low ridges with gently sloping sides and have good surface drainage. The relief of Eutaw clay ranges from broad extensive areas of almost flat level surface to undulating and gently sloping areas. Catalpa clay is developed on flat or almost level areas in the first bottoms along the streams.

Prior to the advent of the boll weevil in 1914 practically all of these soils of the clay uplands and prairies were used for the production of cotton. They are heavy, however, and are late in developing cotton bolls with a consequent destruction of the crop by weevils, especially in rainy seasons. They are adapted to lespedeza, Dallis grass, and Johnson grass, and the present trend in agricultural development is toward cattle raising, dairying, and the production of hay in conjunction with cotton farming.

Houston clay.—Houston clay, locally called "black prairie", has a surface soil of very dark gray or almost black heavy clay to a depth of 6 or 8 inches. Viewed across plowed fields, the surface soil has a dark-brown cast. This is underlain by dark drab-gray clay which gradually changes to drab or brownish yellow at a depth ranging from 15 to 20 inches. These two layers are heavy sticky plastic clay when wet and very hard and compact when dry. In cultivated fields, the surface soil crumbles when dry or moderately moist into granules, or buckshotlike particles, ranging from very small to an inch or more in diameter; the finer granules predominate.

The lower subsoil layer is brownish-yellow or greenish-yellow very heavy plastic clay containing some light-gray mottlings. This layer is neutral or slightly acid. At a depth ranging from 30 to 50 inches it grades into grayish-yellow clay, alkaline in reaction and containing many lime nodules. At a depth ranging from 50 to 80 inches, this material is underlain by white rotten limestone. This limestone, the Selma chalk, contains from 60 to 80 percent of lime carbonate. The surface soil in few places carries lime, except where this is washed from higher lying areas of Sumter soil or is brought up by crawfish from the lower depths. Crawfish have infested some fields and, in places, have brought up so much of the parent material of the soil that productivity has been greatly impaired. During very dry seasons cracks appear in both the surface soil and the subsoil, except in freshly plowed fields.

In a few locations, as northeast of Browns, the black and dark-gray material extends to a depth ranging from 20 to more than 30 inches before the grayish-yellow clay and lime nodules are reached. In other spots here and there the surface soil is shallower, the subsoil layer thinner, and the limy material nearer the surface.

The most extensive areas of Houston clay lie north of Browns, and a number of small bodies occur here and there throughout the prairies. Although this type is not extensive, it is an important

agricultural soil, being one of the most productive of the prairie soils.

About 20 percent of Houston clay is cultivated, and the remainder is used for hay and pasture. Hay and corn are the principal crops, but a small acreage is still planted to cotton. Corn and cotton are seldom fertilized. Corn yields range from 15 to 30 bushels an acre and cotton one-third to more than one-half bale an acre. Johnson grass is the principal hay crop and yields from 1 to 3 tons an acre. Johnson grass stubble should be plowed under every 2 to 4 years. Oats, soybeans, and cowpeas are also grown on this soil for hay. Oats drown in some of the lower lying areas. Dallis grass, carpet grass, black medic, partridge-pea, sensitiveplant, and beggar's-lice comprise the major pasture grasses and plants for quail feed. Lespedeza will grow in a few locations but does not grow luxuriantly. The present tendency is away from general farm crops on this soil toward beef cattle production and dairying.

Houston clay, eroded phase.—Houston clay, eroded phase, differs from Houston clay in that sheet erosion has reduced the thickness of the surface soil. In many places the surface soil has been completely removed and the underlying grayish-yellow clay exposed. In the main, the surface soil to a depth ranging from 5 to 9 inches is dark-gray clay, approximately neutral in reaction, resembling the surface soil of Houston clay. It grades into grayish-yellow clay, slightly acid in reaction, which contains some mottlings of light gray. At a depth ranging from 25 to 35 inches, this grades into yellow clay containing lime nodules. Chalk or calcareous material is present at a depth of 35 to 50 inches.

As the original surface soil is very shallow and the roots of plants growing on it penetrate the slightly acid grayish-yellow clay, this soil is best adapted to crops requiring an acid or neutral soil. Cotton, oats, Johnson grass, soybeans, *Sesbania*, cowpeas, lespedeza, Dallis grass, and peanuts are the main crops grown. The greater part of this soil is used as hay land or for pasture. Johnson grass is the principal hay grown; the use of oats in the Johnson grass fields is recommended, as a good cutting of oats can be obtained in the spring before the grass develops. The pasture grasses best suited to this soil are Dallis grass and lespedeza.

Sumter clay.—Sumter clay, locally known as "gray prairie" or "gray lime land", has a light-gray or yellowish-gray surface soil overlying white or cream-colored weathered chalk. In many places the surface soil and the subsoil are completely removed and the underlying chalk exposed, which gives this soil a very spotted appearance. In the main, the surface soil, to a depth ranging from 5 to 10 inches, is light-gray or grayish-yellow clay containing a large amount of soft lime nodules and fragments. This grades into yellowish-gray or pale-yellow friable calcareous clay containing a large amount of lime nodules and fragments. This continues to a depth ranging from 30 to 35 inches where it grades into pale yellowish-gray or nearly white Selma chalk, or calcareous material. This, in turn, is underlain at a depth ranging from 5 to 8 feet by hard blue-gray chalk. The surface soil is sticky and plastic when wet but granular and friable under favorable moisture conditions. Because of the high

content of chalk fragments, the subsoil is friable and crumbles easily into a fine mass.

Several variations from the typical soil are included with Sumter clay in mapping. In some areas the surface soil is dark gray or rust brown. On most slopes and knolls the surface soil is shallower than that of the typical soil, and on many of the more pronounced slopes it has been entirely removed by erosion, the mottled gray calcareous subsoil being exposed. Many small areas of Oktibbeha clay, or a shallow phase of that soil, are also included. The surface soil in these patches is yellowish-red or brownish-red clay. Where such spots are so numerous as to comprise from 20 to more than 40 percent of an area they are shown on the soil map as Sumter clay, mixed phase. In many slight depressions or flat areas the surface soil of Sumter clay is darker and deeper than that of the typical soil, resembling Houston clay.

The larger areas of Sumter clay are north and east of Marion Junction and south and west of Martins Station. Although the greater part of this type occupies gently sloping surfaces, the run-off is rapid on account of the heavy character of the soil material. This causes serious erosion of the surface soil. Erosion is mainly in the form of sheet washing, although in many places gullies have been formed. Erosion is not so serious on the areas having a grass sod but is especially damaging on cultivated fields where clean-cultivated crops are being grown and where terraces have not been constructed.

Sumter clay is one of the most widely distributed of the prairie soils. All of it was once used for cultivated crops, but at present approximately only 10 percent is cultivated. The remainder is used for hay and pasture, as the land is adapted to black medic, Dallis grass, sweetclover, white Dutch clover, hop clover, and Johnson grass (pl. 1, *A*). The cultivated areas are used mainly for corn and hay crops, as this soil is not adapted to the production of cotton. Such crops as oats, sorgo, and soybeans are well adapted to it. Because of its suitability for pasture and hay crops, Sumter clay offers excellent opportunities for dairying and the raising of cattle, hogs, and sheep. In connection with the associated prairie soils it makes ideal quail preserves.

The pasture recommendations for this soil, according to results obtained at the Marion Junction experiment station, consist of Dallis grass and black medic. These should be fertilized with from 400 to 600 pounds of superphosphate an acre. Corn is seldom fertilized, but the use of 100 to 200 pounds of nitrate of soda would probably be profitable. Oats should be fertilized with 200 to 375 pounds of superphosphate in the fall and with 150 to 225 pounds of nitrate of soda in the spring.

Sumter clay, mixed phase.—Sumter clay, mixed phase, is locally known as "mixed prairie." It differs from Sumter clay in having areas of Oktibbeha clay, together with small areas of Vaiden and Houston clays, included. These are so intricately associated and so small that their separation on the soil map cannot be shown. The characteristics of each of the soil types comprising this classification are described under each soil type, and reference is made to these descriptions for detailed information. Sumter clay probably

comprises 70 percent, Oktibbeha clay 20 percent, and Vaiden and Houston clays each 5 percent of the area mapped as the mixed phase.

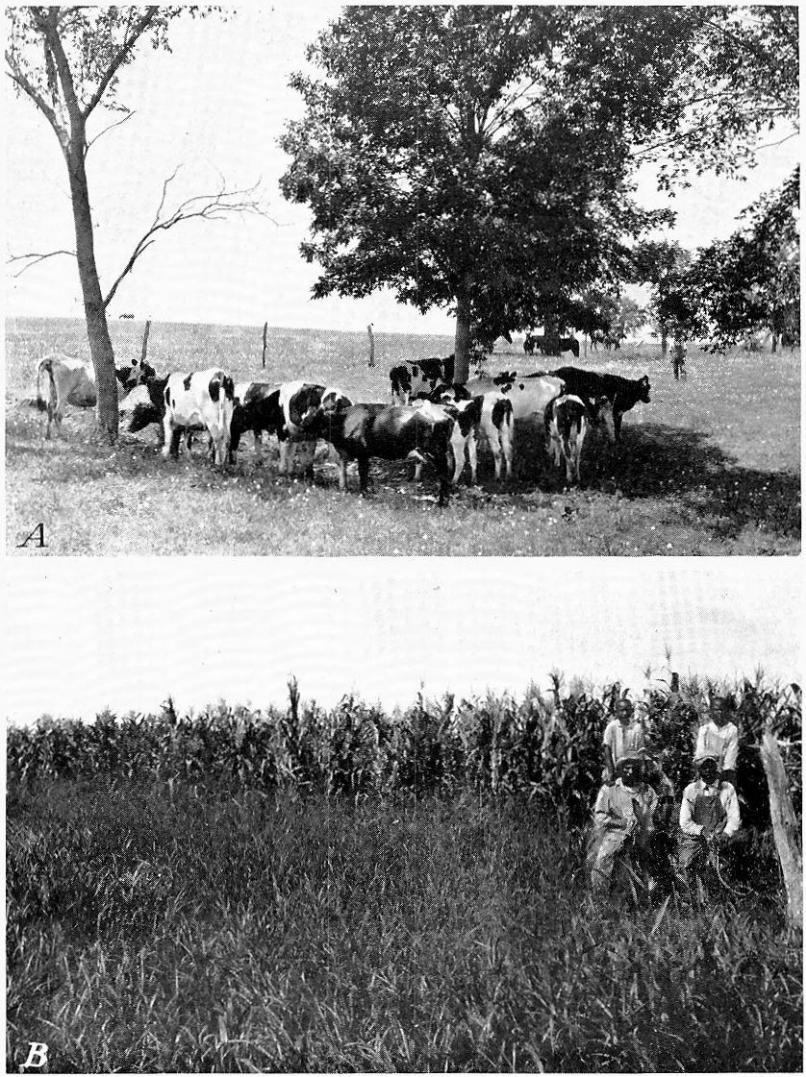
Sumter clay, mixed phase, occurs in association with the other prairie soils. The largest areas are in the vicinities of Blalock and Safford, where many of the ridges and upper slopes have suffered loss of topsoil by erosion.

Only about 20 percent of the soil of this phase is cultivated. Of this, about 60 percent is used for cotton, and the remainder is used for corn, hay, soybeans, cowpeas, and other crops. The uncultivated area is utilized for pasture, and some of the Oktibbeha and Vaiden areas are forested with old-field pine and some hardwoods. The methods of farming and fertilization are similar to those prevailing on the types included in this phase.

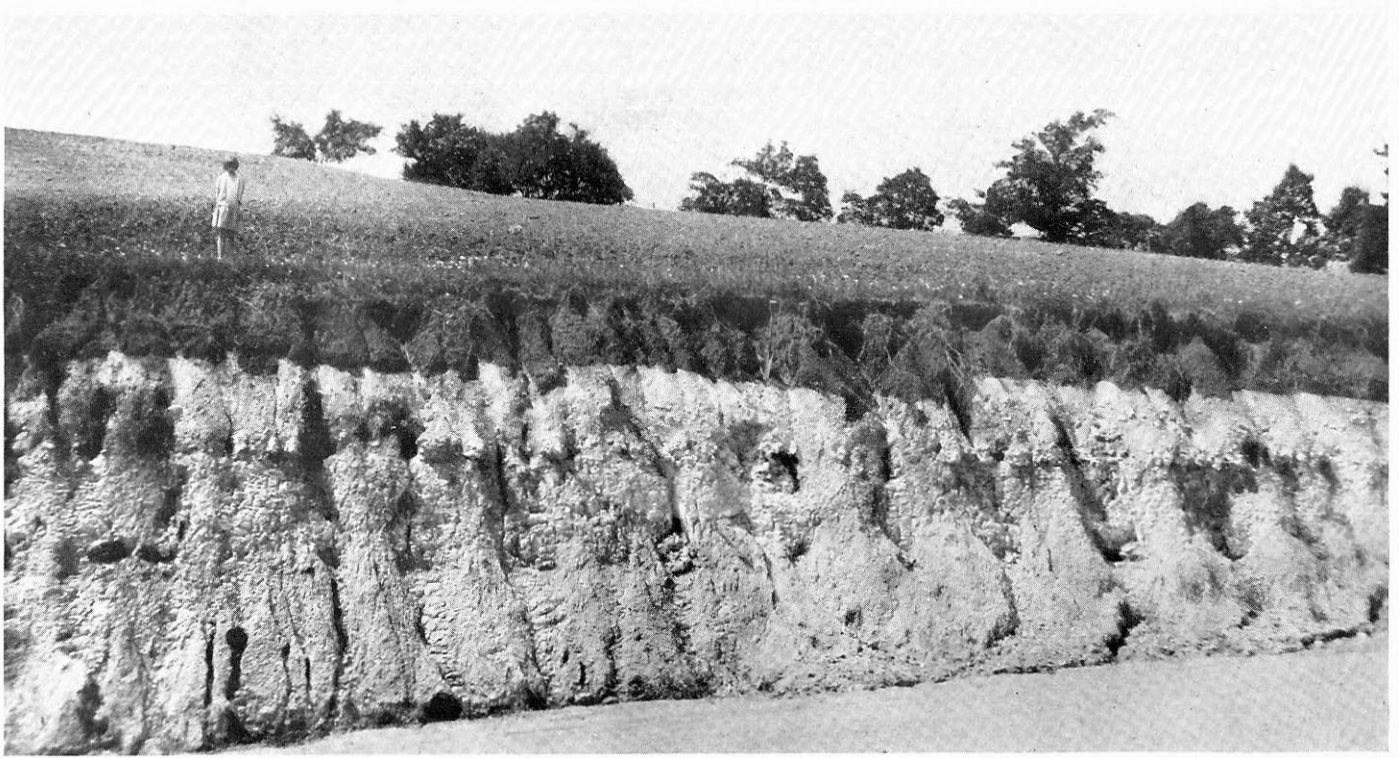
Bell clay.—Bell clay resembles Houston clay, and in many places the two soils grade imperceptibly into each other. Bell clay represents material that has been washed from the higher lying Houston and Sumter soils and deposited along the heads of the small drainageways and at the bases of the slopes, or outer margins of the stream bottoms. The surface soil and the upper subsoil layer are similar in color and structure to those of Houston clay. Bell clay differs from Houston clay mainly in the character of the lower subsoil layer. Bell clay, to a depth ranging from 25 to 40 inches, is dark-gray or almost black soil. This grades into gray or dark-gray clay mottled with brown and yellow. This layer is generally acid, but in many places it is alkaline. The soil is sticky and plastic when wet but is crumbly and breaks down to a coarse granular structure when dry, especially where the soil receives limy deposits from the Sumter areas. Although Bell clay lies above normal overflow of the streams, it constantly receives thin sheets of water from the adjacent upland slopes. The surface is flat or gently sloping toward the streams. The drainage is fairly good on the gentle slopes, but the run-off of rain water is slow on the flat areas. The internal drainage is slow on account of the heavy character of the soil material. In the flat areas, the dark surface soil is shallow and the subsoil is more highly mottled than on the gentle slopes. Bell clay occurs in small areas throughout the prairie soils.

It is the most fertile of the prairie soils, and all of it has been cleared. It is used principally as hay and pasture land; but a large acreage is used for the production of corn, which yields from 20 to 50 bushels, or an average yield of 30 bushels an acre without fertilizer. Johnson grass (pl. 1, *B*) is the principal hay crop grown, and Dallis grass, white Dutch clover, and black medic are the principal pasture grasses. For intensive grazing, these should be fertilized with from 400 to 600 pounds of superphosphate. Partridge-peas, sensitive-plant, and beggar's-lice also grow well, supplying large quantities of quail feed.

Bell clay, poorly drained phase.—Bell clay, poorly drained phase, differs from typical Bell clay in that the surface soil is not so thick and the subsoil is gray mottled acid sticky clay resembling the subsoil of Eutaw clay. The surface soil represents Bell clay material that has been washed from the Sumter and Houston soils and deposited over areas of Eutaw clay. The surface soil, to a depth



A, Pasture on mixed prairie soils in the foreground and on Sumter clay in background; *B*, corn and Johnson grass hay on Bell clay.



Oktibbeha clay over Selma chalk, about 9 miles west of Selma.

ranging from 6 to 10 inches, is dark-gray or almost black clay, and the subsoil is light-gray mottled sticky clay. Water stands on the surface of this soil several days after rains. The subsoil drainage is extremely poor. The greater part of this soil is used as hay and pasture land. Johnson grass is the principal hay crop, and Dallis and carpet grasses are the principal pasture plants. These are particularly well adapted to this soil. This soil is not so productive as typical Bell clay, but it is a good soil for the production of the crops mentioned.

Catalpa clay.—Catalpa clay has been formed from materials washed from the higher lying prairie and associated clay soils and deposited in the first bottoms along the stream courses during periods of overflow. It is slightly lighter in color than Bell clay and occupies a lower lying position, being subject to overflow during high water. The surface soil is dark-gray or grayish-brown clay usually mottled with rust brown. It generally extends to a depth ranging from 6 to 10 inches. The subsoil is gray, brownish-gray, or mottled drab and brown plastic clay which becomes mottled with gray, yellow, and brown below a depth ranging from 15 to 18 inches. Both the surface soil and subsoil are very sticky and plastic when wet and crack on drying. Much of the surface soil is calcareous, especially along the smaller streams lying near the limestone soils. The subsoil is decidedly acid.

This soil contains considerable organic matter and is fairly retentive of moisture. It clods if plowed too wet but breaks to a coarse granular structure if plowed in a moderately moist condition. The greater part of Catalpa clay has slow drainage on account of the flat surface and the heavy character of the material, which impedes the downward movement of soil water. Most of the wide bottom lands on Mud Creek consist of this type, the greater part being in cultivation. Large areas are developed in the first bottoms along Boguechitto, Bear, and Pine Barren Creeks, and smaller areas are elsewhere in the region of prairie soils.

Probably 40 percent of Catalpa clay is in forest, and most of the remainder is in pasture and hay. The tree growth consists mainly of sweetgum, haw, water oak, willow oak, willow, elm, ironwood, maple, ash, hackberry, cottonwood, and sycamore. Carpet grass, Dallis grass, partridge-pea, beggar's-lice, and lespedeza are the principal pasture plants. These grasses furnish good grazing from early spring until late fall. In the wooded areas switch cane and other undergrowth furnish fairly good winter pasture. Under the present maintenance of pasture lands, the growth of the grasses is greatly retarded by broomsedge, bitterweed, ragweed, dogfennel, and many other coarse grasses and weeds. Johnson grass is the principal hay crop grown and produces from 2 to 3 tons yearly.

The cultivated areas of Catalpa clay are used principally for the production of corn together with some sorgo. Corn is planted on the better drained areas and yields from 20 to 40 bushels an acre, the average yield being 25 bushels. Sorgo produces from 8 to 12 tons of silage an acre or from 75 to 150 gallons of sirup. The sirup is of darker color and is inferior in quality to that produced on the lighter colored soils. A few small patches are planted to cotton. Fertilizers are not used on any of these crops.

Catalpa clay is a heavy soil of high productivity. The fertility is constantly renewed by the wash of humus and soluble plant nutrients from the upland soils. As surface drainage is poor on the greater part of it, the use of canals or open ditches would be very beneficial.

Oktibbeha clay.—Oktibbeha clay, locally known as "red post oak prairie", has a 4- to 6-inch surface covering of reddish-brown or dark reddish-brown clay. This grades into brown or yellowish-red heavy clay mottled with brown and extends to a depth of approximately 18 inches, where it becomes intensely mottled with gray, yellow, and brown. This extends to a depth ranging from 24 to 50 inches, where it grades into yellow clay overlying the Selma chalk, or Ripley marl (pl. 2). In most places a very sharp line of demarcation is between the heavy clay and the calcareous material. The surface soil and the subsoil are acid, but the underlying material is strongly calcareous. Both the surface soil and subsoil are heavy clays which are compact and tough when dry but sticky and plastic when wet. This soil cracks badly on drying and gives up its moisture slowly to the growing plants. It can be handled only under a narrow range of moisture conditions. If plowed too wet, it bakes on drying and the resultant clods are a handicap for the remainder of the season.

In some locations a shallow covering ranging from 2 to 4 inches in thickness of brown fine sand overlies the surface soil. This sandy covering increases the moisture-holding capacity and the ease of tilling the soil, and crops do better than on the typical soil. Spots of Vaiden clay and Sumter clay are included.

Although Oktibbeha clay has a favorable relief, being mainly undulating or gently rolling, it is subject to serious erosion.

The largest areas of this soil are southeast and northwest of Safford and about 4 miles northeast of Marion Junction.

About 40 percent of this land is now under cultivation, and the greater part of the remainder is used for hay and pasture. The forested areas support a mixed growth of old-field pine, black gum, sweetgum, red oak, post oak, hickory, and a few other hardwoods.

Probably 90 percent of the cultivated area is used for the production of cotton, yields of which vary greatly, as a result of seasonal conditions, quantity and quality of fertilizers used, and amount of destruction by boll weevils. The yields range from one-fourth to one-half bale an acre. Cotton is generally fertilized with from 150 to 300 pounds of 4–8–4 fertilizer; but an application ranging from 400 to 600 pounds of a 6–10–4 fertilizer should increase the yields from one-half to three-fourths of a bale an acre, provided the proper cultural practices are followed. Oats, soybeans, peanuts, and velvetbeans give fairly good returns.

Johnson grass is the principal hay crop, the yield being 1 to 3 tons an acre. The pasture grasses are lespedeza, carpet grass, Bermuda grass, and Dallis grass. For intensive grazing these should be fertilized with from 400 to 600 pounds of superphosphate. The growth of the better grasses is greatly handicapped by broomsedge, bitterweed, dogfennel, and many other coarse weeds and grasses. These should be kept mowed.

In former years, practically all of this soil was used for the production of cotton, but with the advent of the boll weevil and the de-

pletion of the surface soil by sheet erosion, as the result of clean cultivation, a large acreage has been converted into pasture. This soil is naturally droughty, consequently the growth of grasses over most of it is greatly retarded.

Vaiden clay.—Vaiden clay is closely related to Oktibbeha clay, but the surface soil of Vaiden clay is yellow, whereas that of Oktibbeha clay is red, and the relief of Vaiden clay is not generally so rolling as that of Oktibbeha clay. The surface soil of Vaiden clay is only 3 to 5 inches thick. This grades into brownish-yellow heavy sticky clay which extends to a depth of approximately 12 inches, where it is underlain by bright-yellow clay which extends to a depth ranging from 32 to 40 inches. This grades into mottled yellow and gray clay, which, in turn, rests conformably on Selma chalk at a depth ranging from 40 to 70 inches. This soil is extremely plastic and sticky in both the surface soil and the subsoil when wet and becomes hard and baked on drying unless plowed when moderately moist. It also checks and cracks badly on drying unless plowed regularly.

The largest areas of Vaiden clay are south and west of Martins Station, and smaller bodies are near Marion Junction and here and there in the prairie section.

About 70 percent of Vaiden clay is under cultivation, and the remainder is used for pasture. This soil is considered better adapted to cotton than to corn, and cotton occupies about 90 percent of the cultivated area. The corn produced is mainly in the cotton fields and is streaked across the fields in rows about 20 feet apart or planted in skips. The yields of cotton range from about one-fifth to more than one-half bale an acre, depending on the amount of fertilizer applied and the seasonal conditions. An acre application of 400 to 600 pounds of a 6–10–4 fertilizer should be used for most economical returns. The yields of corn range from 10 to 25 bushels an acre, depending on the fertilizer used and on the use or nonuse of cover crops. An acre application of 150 to 225 pounds of nitrate of soda is recommended unless a cover crop is used. Oats, soybeans, crotalaria, and peanuts are well adapted to this soil. Oats produce from 30 to 50 bushels an acre, the higher yields in favorable seasons and when fertilized with 150 to 200 pounds of nitrate of soda or the equivalent an acre. This soil is well adapted to lespedeza, Dallis grass, and in the low-lying positions to carpet grass, consequently it makes good pasture, particularly when used in connection with the associated lime soils which support early grazing before the plants on this soil have attained sufficient size in the spring. This soil is also adapted to *Sesbania*, benne, bushclover, beggar's-lice, sensitiveplant, and wild peas, making it valuable as a game preserve.

Vaiden fine sandy loam.—Vaiden fine sandy loam, locally known as "yellow sandy prairie", is intermediate in color and soil development between Oktibbeha clay and Eutaw clay. In the most representative areas of Vaiden fine sandy loam, the surface soil to a depth ranging from 4 to 7 inches is pale-yellow or grayish-yellow friable fine sandy loam or very fine sandy loam. This grades through about 2 inches of yellow heavy clay loam into a yellow plastic clay subsoil. The subsoil to a depth of approximately 24 inches is yellow plastic sticky clay usually mottled with shades of red and yellow in

the lower portion. This is underlain by grayish-yellow or yellow clay mottled with shades of red, brown, and, in places, gray. The subsoil, when wet, is heavy sticky plastic clay, not so sticky as Eutaw clay. This is underlain at a depth ranging from 6 to 8 feet by gray calcareous material.

The color and the depth of the surface soil vary considerably here and there in the county. Southeast of Safford are a number of areas in which the surface soil is very light gray fine sand, underlain by yellowish-gray fine sand or loamy fine sand to a depth ranging from 8 to 15 inches. This layer is underlain by heavy yellow clay in places where the surface soil covering is shallow. This is a good soil for general farm and truck crops. Near Manila is an area that has a yellow subsoil, practically free of mottlings, which is underlain at a depth of 30 inches by yellow, green, and brown sand. This soil is subject to serious sheet erosion, but it is an unusually good soil for the production of cotton.

The most extensive areas of Vaiden fine sandy loam are south of Martins Station, north of Selma, and in the southeastern part of the county. This soil occupies low rather broad ridges. Practically all of it has been cleared.

This soil lends itself better to a diversified agriculture than any of the other prairie, or so-called prairie, soils and is the easiest of these soils to farm. Probably 80 percent is in cultivation. About 50 percent of the cultivated area is planted to cotton and the remainder to corn and to truck and garden crops. The rest of the land is used for forestry and pasture; it is not well adapted to pasture grasses, however, but of these Bermuda grass and lespedeza grow best. It is very responsive to the use of fertilizers and the turning under of green cover crops. Even though yields of cotton range from only one-fourth to a little more than one-half bale an acre, they can be increased to two-thirds or three-fourths of a bale by the use of the following 2-year rotation: First year, cotton followed by vetch; second year, corn and soybeans. The corn yield should, under this type of rotation, range from 20 to 40 bushels an acre. This soil is also adapted to *Sesbania*, benne, partridge-peas, and beggar's-lice, and these, together with the grasses, make it valuable as a quail preserve.

Eutaw clay.—Eutaw clay is locally known as "gray prairie" or gray crawfish prairie." In cultivated fields, the surface soil to plow depth, which seldom exceeds 4 inches, is dingy gray-brown clay, but in forested areas the upper 1 inch of the surface soil is dark brown, containing considerable organic matter. The upper subsoil layer, to a depth ranging from 10 to 12 inches, is pale grayish-yellow clay mottled with gray and brown. This grades into pale-gray or light-gray clay which is highly mottled with yellow and some brown and red. This extends to a depth ranging from 80 to 100 inches, where it grades into blue-gray and yellow mottled clay. Calcareous material lies from 6 to 15 feet below the surface. The surface soil and the subsoil are heavy clays, very sticky and plastic when wet. The subsoil never dries out, but the surface soil cracks and checks on drying. Crawfish chimneys are conspicuous over most of the type, especially in the lower lying positions.

In some locations, as to the north of Westbrook, are many patches in which the surface soil consists of about 2 inches of gray silt loam or very fine sandy loam, underlain by yellowish-gray silt loam or heavy fine sandy loam, which rests on the heavy subsoil at a depth ranging from 4 to 6 inches. These areas are easier to till and are slightly more productive than the typical soil.

Eutaw clay occupies lower lying areas in the prairies than Vaiden fine sandy loam. It occurs in rather large bodies, the most extensive being at Westbrook, and north and south of that place, and in the vicinities of Browns and Marion Junction. The relief ranges from almost level and undulating to gently rolling. Surface drainage is poor on the flatter areas, and internal drainage is slow.

About 60 percent of Eutaw clay has been cleared and is used for cotton and pasture. The remainder is used for forestry, supporting a growth of shortleaf pine, post oak, blackjack oak, and some red oak. At present, probably 20 percent of the cleared land is cultivated, principally to cotton. This soil warms late in the spring, and cotton is, therefore, late in maturing fruit. This was no barrier to the production of cotton prior to the advent of the cotton boll weevil in 1914; but since then considerable damage has been done by the weevils, resulting in decreased yields. The cotton yields under current conditions range from one-fourth to one-half bale an acre. The yields can be considerably increased by the use of 300 to 600 pounds of a 6–10–4 fertilizer an acre. Corn is grown mainly in the cotton fields, being planted across the fields in rows about 20 feet apart or planted in skips. In this way the corn is given more space than in cornfields, and larger ears are produced. Corn grown on this soil should be fertilized with 150 to 225 pounds of nitrate of soda an acre following cotton that has been heavily fertilized. In the low-lying positions where there has been an accumulation of the surface soil material, corn and hay are well adapted and do unusually well. Eutaw clay can be used for growing oats, peanuts, soybeans, *Sesbania*, lespedeza, carpet grass, Dallis grass, and crotalaria. In addition, such vegetables as okra, beets, beans, collards, cabbage, tomatoes, and cantaloups do well.

MISCELLANEOUS SOILS AND LAND TYPES

The group of miscellaneous soils and land types comprises several soil types, hilly phases, and classifications of material which differ widely in their characteristics and land use. It includes Ruston fine sandy loam, hilly phase; Red Bay fine sandy loam, hilly phase; Susquehanna clay; Plummer fine sandy loam; Sumter clay, hilly phase; Oktibbeha clay, hilly phase; Leaf clay loam; Leaf very fine sandy loam; Myatt fine sandy loam; Kalmia fine sand; Ochlockonee fine sandy loam; Ochlockonee silt loam; Guin soils, undifferentiated; meadow (alluvial material); swamp; and dune sand.

These soils and land types are scattered throughout all parts of the county, even occurring within some areas of the best agricultural soils. They range from rough, broken, hilly, and gullied areas to level areas and depressions and from excessively well drained areas to wet lands and swamp.

The forest growth on the hilly phases of Ruston and Red Bay fine sandy loams, Susquehanna clay, some of the fine sandy loams, and Guin soils, undifferentiated, is principally old-field pine, rosemary pine, longleaf pine, post oak, black oak, white oak, hickory, sweetgum, black gum, and dogwood, with some cedar and poplar. On the Plummer, Myatt, and Ochlockonee soils and on meadow (alluvial material) and swamp the hardwoods predominate. Only a very small percentage of the soils in this group is under cultivation. Some of the soil types, particularly Plummer fine sandy loam, Leaf very fine sandy loam, Myatt fine sandy loam, and meadow (alluvial material), are well suited to the production of pasture grasses, and Ochlockonee fine sandy loam and Ochlockonee silt loam are good agricultural soils where drained.

Ruston fine sandy loam, hilly phase.—Ruston fine sandy loam, hilly phase, differs from Ruston fine sandy loam in occupying rolling to hilly relief. The extent and character of erosion and the depth of the surface soil are variable. In the main, the surface soil, to a depth ranging from 4 to 6 inches, is gray loamy fine sand. This grades into yellow or slightly brownish yellow fine sandy clay which extends to a depth ranging from 8 to 12 inches, where it grades into yellowish-brown or reddish-brown friable fine sandy clay. In many places the surface soil is completely removed, and the reddish-brown sandy clay subsoil is exposed. This material is hard, as the result of being baked by the sun. On the lower slopes or flat positions the surface soil may be as thick as 12 or 18 inches. Included with this soil are small areas of Susquehanna and Oktibbeha fine sandy loams along the lower slopes. These soils have a heavy clay subsoil underlain by heavy clay or marl. The variations and inclusions occupy such small areas and are so intricately mixed that separation into soil types cannot be made on a small-scale map. This soil also includes the hilly soils and steep slopes of Orangeburg fine sandy loam, and of the gravelly areas of Ruston fine sandy loam, all of which have the same agricultural use.

Ruston fine sandy loam, hilly phase, occurs in close association with the other sandy uplands. The relief, for the greater part, has a slope ranging from 7 to 15 percent, although steeper slopes occur on the breaks extending from nearly level plateaulike areas to the lower lying land. The surface run-off is vigorous, and erosion is severe. About 20 percent of this land has been cleared, but many of the small fields or patches have been abandoned. At present from 5 to 10 percent is cultivated, and this is on the hilltops and more gentle slopes. The yields average much lower than on the typical soil. The forested areas support a second growth of longleaf and shortleaf pines, together with a mixed growth of hardwoods. The more gentle slopes of this phase, if cleared and seeded to Bermuda grass and other good pasture grasses, would furnish good grazing the greater part of the year. As a whole, this phase is best suited to forestry. This fact and the rapidity with which abandoned fields revert to an almost pure stand of pine suggest the advisability of their use for this purpose.

Red Bay fine sandy loam, hilly phase.—Red Bay fine sandy loam, hilly phase, is separated from Red Bay fine sandy loam on account of its hilly and rolling surface features. The surface has a slope ranging

from 7 to 20 percent. Erosion is very active over all the phase and, in many places, has removed the original surface covering of fine sandy loam, exposing the red sandy clay subsoil. Where the surface soil has not been removed entirely, it is reddish-brown fine sandy loam. The subsoil is bright-red heavy but friable fine sandy clay. At a depth ranging from 5 to 8 feet stratified sands and clays are reached.

Red Bay fine sandy loam, hilly phase, includes steep slopes or rolling areas of Akron loam and of Red Bay fine sandy loam. It occurs mainly in the northern part of the county in association with Red Bay fine sandy loam and Akron loam.

Probably 40 percent of this soil is cleared land, about half of which is in cultivation. Cotton is the principal crop grown; the yields are low, ranging from one-fifth to one-half bale an acre where a small application of a low-grade fertilizer is made. This soil is best adapted to cotton, oats, winter cover crops, and lespedeza. Very careful supervision is necessary to improve the soil; it can be done by first constructing high broad-based terraces and then using winter cover crops or summer hay crops, both of which tend to prevent erosion. Vetch and Austrian Winter peas are the best winter cover crops, and lespedeza, crotalaria, and kudzu are probably the best summer crops for soil improvement. Lespedeza or kudzu may be used as pasture or cut for hay, but crotalaria is suited only for soil improvement. Overgrazing must be avoided on the kudzu.

Susquehanna clay.—Susquehanna clay in wooded areas has a 2- to 4-inch surface covering of grayish-brown or reddish-brown loam or clay loam, the upper portion containing some organic matter. This is underlain by red heavy plastic clay, to a depth ranging from 10 to 15 inches, passing into mottled red, gray, and yellow plastic clay. This changes into an intensely mottled gray, yellow, and red heavy plastic clay. At a depth ranging from 50 to 80 inches, this grades either into a more friable micaceous clay or into light-gray or blue-gray clay or heavy clay.

As mapped, Susquehanna clay includes small areas of Susquehanna fine sandy loam, small spots of Ruston fine sandy loam, and some areas of Oktibbeha clay that are too small to be separated on the soil map. Ruston fine sandy loam occupies the narrow hill crests or upper slopes, and Oktibbeha clay lies at the bases of hills. This mixture of soil types is especially in the extreme western part of the county. The areas of Susquehanna clay near Central Mills Station include spots of sandy loam and also exposures of gray calcareous clay and marl in the lower portions.

The largest areas of Susquehanna clay are developed in the southeastern part of the county north and south of Pleasant Hill. Other areas occur in the extreme western projection north and east of Central Mills Station.

The greater part of Susquehanna clay occupies rolling to hilly relief. The slopes generally range in gradient from 5 to 12 percent; but some areas have less than a 5-percent slope. The heavy subsoil absorbs water very slowly, and this, in conjunction with the rolling surface relief, subjects the soil to serious sheet erosion. This, together with the pine tree growth prevents the development of a deep surface soil.

Practically all of Susquehanna clay is used for forest, native pasture, and game preserves. The tree growth is largely old-field pine and red oak, post oak, sweetgum, and other hardwoods. Carpet grass and native underbrush supply the principal part of the cattle feed. Carpet grass grows in the lower lying positions and on the lower slopes. Less than 3 percent of this soil is cultivated, and this is planted to small patches of cotton on the more level areas. Forestry is recommended for Susquehanna clay.

Plummer fine sandy loam.—Plummer fine sandy loam is a poorly drained soil associated geographically with the Norfolk, Ruston, Orangeburg, and Susquehanna soils of the uplands. It occupies flat areas, swales, and slight depressions, lying lower than the surrounding soils, and receives the drainage and seepage waters from the higher areas. It is in many narrow winding swales in the vicinity of Orrville and to a larger extent in the east-central part between Berlin and Tyler. It is saturated during rainy seasons, and water stands over much of the surface for long periods after rains. The surface soil, to a depth of 5 to 7 inches, is gray fine sandy loam containing considerable organic matter and underlain by pale yellowish-gray loamy fine sand showing mottling of gray, yellow, and brown. This is underlain by heavy gray clay containing yellow and brown mottlings.

The drainage of these areas is poor, consequently most of the land is still in forest or woodland pasture supporting a growth of sweetgum, old-field pine, water oak, post oak, and elm. The cleared areas support carpet grass, Bermuda grass, and lespedeza. Gallberries and blackberries grow luxuriantly, producing feed for quails. Partridge-peas, lespedeza, *Sesbania*, benne, and beggar's-lice can be grown for bird feed along the outer edges where drainage is best. The best use for this soil is pasture or forest, or a combination of the two.

Sumter clay, hilly phase.—Sumter clay, hilly phase, differs from Sumter clay in surface relief and degree of erosion. It comprises rather narrow winding ridges and hills having sloping to rolling sides. It has been subjected to very serious erosion, and the underlying Selma chalk is exposed in probably from 10 to 20 percent of the areas. Only a few small patches of this soil are farmed, but most of it is included in pasture land. Those areas which are farmed are used for the production of vegetables around the houses and for a few small patches of corn and hay. Even though the greater part of this soil is used for pasture, only a small amount of vegetation suitable for grazing grows on it, mostly in the early spring. Black medic and sweetclover, both of which supply grazing during the early spring, are the principal crops. Some Dallis grass may be produced for summer and fall grazing. Cedars comprise the principal tree growth in small areas. Where erosion has not been too serious, some haw, honeylocust and Osage-orange trees grow.

Oktibbeha clay, hilly phase.—Oktibbeha clay, hilly phase, occupies more broken surface relief and has suffered more severely from erosion than the typical soil. The surface soil of this phase, particularly on the small ridge tops and caps and adjacent to the hilly sandy soils, has a 2- to 3-inch covering of fine sand; these areas, however, are not representative of the phase. In general

the surface soil, to a depth ranging from 2 to 3 inches, is brown heavy sticky clay. This grades into red or brown heavy sticky clay which becomes mottled with yellow, brown, and gray at a depth ranging from 10 to 19 inches. This, in turn, rests conformably, at a depth ranging from 28 inches to 4 feet, on the underlying Selma chalk or calcareous material. Oktibbeha clay, hilly phase, includes hilly areas of Oktibbeha fine sandy loam and numerous small bodies of Sumter clay and Selma chalk.

The largest areas of this soil are about 3½ miles west of Minter; smaller bodies occur here and there in the prairie. The rough hilly character of this soil renders it unfit for cultivation, and it is used, therefore, for forest and pasture. The forest growth consists principally of old-field pine, some rosemary pine, and post oak, white oak, gum, and other hardwoods on the Oktibbeha areas, and cedars are the principal trees on the included Sumter soils. The grasses are similar to those growing on Oktibbeha clay.

Leaf clay loam.—Leaf clay loam is on the low terraces along the larger creeks in close association with Leaf very fine sandy loam. The drainage conditions on these two soils are very similar. The surface soil, to a depth ranging from 2 to 4 inches, is pale-gray clay loam or very fine sandy clay loam. This grades into pale-gray plastic clay containing some small brown mottlings. This layer extends to a depth ranging from 20 to 28 inches, where it grades into gray or bluish-gray plastic clay.

The largest bodies of Leaf clay loam are mainly along Bogue-chitto and Chilatchee Creeks. About 50 percent of this soil has been cleared, and most of the cleared land is used for pasture. The forested areas are used largely as woodland pasture. Carpet grass and lespedeza are the principal pasture plants, although some Bermuda grass and Dallis grass are grown. In the forested areas, the grazing is confined to underbrush, gray moss, and native grasses. The forested areas support a growth of sweetgum, elm, some old-field pine, maple, post oak, rattan vines, and grapes. *Sesbania* and benne can be grown on this soil as quail feeds to supplement the French mulberries, blackberries, and gallberries. A small acreage of this soil is planted to cotton and corn. Because of the droughty nature of the soil, corn, which is generally planted in skips in the cotton, gives very uncertain yields. Cotton yields range from one-fifth to one-third of a bale an acre.

Leaf very fine sandy loam.—Leaf very fine sandy loam occurs on the creek terraces in association with the other soils of the Leaf series. It has a finer textured surface soil, is less well drained, and has less red and more gray in the subsoil than Leaf fine sandy loam. It occupies a flat to billowy surface. The run-off of rain water is very slow, and the heavy character of the subsoil material retards underdrainage.

The surface soil, to a depth ranging from 4 to 7 inches, is light-gray very fine sandy loam. This grades into light yellowish-gray or pale-gray friable very fine sandy clay which extends to a depth ranging from 15 to 24 inches, where it grades into gray or bluish-gray heavy plastic and compact clay containing mottlings of yellow, brown, and a small amount of red.

The largest bodies of Leaf very fine sandy loam are west of Beloit, south of Browns, and north of Martins Station. Smaller areas are here and there along the larger creeks.

Only about 20 percent of this land has been cleared. The remainder supports a growth of sweetgum, old-field pine, black gum, elm, water oak, post oak, and pin oak. Of the cleared areas, only a small acreage is now cultivated, the remainder being in pasture. The pasture grasses consist principally of carpet grass, lespedeza, Bermuda grass, and some Dallis grass. The cultivated areas are farmed mainly by Negro tenants, and the greater part of the land is used for the production of corn, as it is not well suited to the production of cotton. The corn is seldom fertilized, and the yields range from 6 to 15 bushels an acre. This soil does not lend itself to the use of winter cover crops except where deep ditches have been dug or in a few of the higher lying positions. The soil is well suited to the production of sorgo, which is grown in small patches by the tenant farmers and is seldom fertilized. The yields of sirup range from 40 to 100 gallons an acre. The summer legumes, particularly soybeans, *sesbania*, benne, and crotalaria, should do well on this soil. The best uses for this soil are forestry and pasture.

Myatt fine sandy loam.—Myatt fine sandy loam is associated with soils of the Kalmia, Cahaba, and Leaf series on the stream terraces occupying the lowest lying positions. The surface is flat or depressed, and water stands on the surface of much of it during the winter or rainy seasons. The greater part of this soil, however, dries out during the summer and fall seasons.

The surface soil of Myatt fine sandy loam is gray or dark-gray fine sandy loam or loamy fine sand mottled with rust brown and underlain by a gray friable fine sandy loam or loamy fine sand subsoil mottled with yellow and rust brown. At a depth of about 36 inches mottled blue, gray, yellow, and brown heavy sticky sandy clay is usually present. This heavy stratum retards underpercolation. The surface soil in places is very dark gray, almost black, especially in the semiswampy areas that have favored a dense growth of trees and grasses and accumulated large amounts of vegetable matter. The texture of the surface soil is silt loam in some locations, but in other areas it is a uniform fine sandy loam or a loamy fine sand. Little or no difference is apparent in the drainage conditions or character of the vegetation on the two types.

Approximately 20 percent of Myatt fine sandy loam has been cleared for pasture and supports a covering of lespedeza, carpet grass, and Bermuda grass, together with a few other grasses and coarse weeds. In ante-bellum days some Myatt fine sandy loam was drained and cultivated. This is indicated by the outlines of the former drainage ditches, practically all of which have been filled and have no value at present. The wooded areas support a growth mainly of water-loving trees such as sweetgum, black gum, bay, and willow, together with some hardwoods and old-field pine. Under present economic conditions, the best use to be made of this soil is forestry and pasture. Gallberries, blackberries, dewberries, various grasses, and partridge-peas growing on this soil make valuable bird feed. *Sesbania* and benne can be grown for bird feed on the better drained

portions. Carpet grass, Bermuda grass, and lespedeza make valuable grazing on the better drained parts.

Kalmia fine sand.—Kalmia fine sand and Kalmia loamy fine sand are very closely related, and in many places the two soils grade imperceptibly into each other. Kalmia loamy fine sand contains from 10 to 15 percent clay, but Kalmia fine sand contains less than 10 percent clay. The difference in productivity of these soils is due to this difference in clay content and the resultant moisture conditions. The surface soil, to a depth ranging from 8 to 12 inches, is gray fine sand. The subsoil, to a depth ranging from 5 to 8 feet, is yellowish-gray or grayish-yellow fine sand. A few small areas of Cahaba fine sand that were too small to be separated are included with this type. Small areas of Kalmia loamy fine sand and small areas of Myatt fine sandy loam, not more than one-half acre in size, also are included.

The largest areas of Kalmia fine sand are immediately south of Selma along the Louisville & Nashville Railroad. Smaller areas are about 3 miles southeast of Selma on the north side of Alabama River.

Not more than 10 percent of this soil is in cultivation. The remainder supports a growth of scrub oak and turkey oak, with some native grasses. Bermuda grass can be grown in a few locations. This soil has very little value for forest, pasture, or cultivation, but the best use is forestry. Pursley (Mexican-clover) produces a large quantity of seeds that are valuable as quail feed.

Ochlockonee fine sandy loam.—Ochlockonee fine sandy loam lies on the first bottoms of Alabama River and the larger creeks, the materials composing this soil having been washed from the sandy uplands and deposited during times of comparatively recent overflows. It occupies a flat position and is subject to overflow during high water. The surface soil is grayish-brown or brownish-yellow fine sandy loam from 6 to 10 inches thick. The subsoil is grayish-brown or yellowish-brown friable clay loam or fine sandy clay with mottlings of yellow, rust brown, and gray at a depth ranging from 20 to 30 inches. The mottlings are more conspicuous in the less well drained areas. Where the drainage is poor, the surface soil is mottled rust brown, and the subsoil is pale-yellow or yellowish-gray fine sandy clay mottled with gray, yellow, and rust brown.

Included with Ochlockonee fine sandy loam are strips of Congaree loam and Congaree fine sandy loam bordering Alabama River. The surface soil is brown or dark brown, mellow, and friable, and the subsoil is light-brown friable micaceous loam, fine sandy loam, or silty clay loam. These soils lie higher than the Ochlockonee soils, are less subject to overflow, are better drained, and are generally more productive than Ochlockonee fine sandy loam. A higher percentage of these soils is cultivated than of the Ochlockonee soil. The color and texture of both surface soil and subsoil vary widely because of differences in drainage and sedimentation during periods of overflow. Where affected by wash from the limy soils, the surface soil is slightly sticky and the subsoil is heavier than typical. In such places, lespedeza, Bermuda grass, carpet grass, Johnson grass, and Dallis grass thrive and resist invasion by briers and bushes much better than on the lighter soil.

Probably 25 percent of Ochlockonee fine sandy loam is cleared, and about 10 percent is now cultivated. The remainder is in woods and pasture. The tree growth is a mixture of hardwoods, loblolly pines, and water-loving flora. The cultivated crops consist of corn, sorgo, sugarcane, and soybeans, the yields of which are very good. Crops are sometimes destroyed by overflows during the growing season. The good pasture is afforded by carpet grass, Dallis grass, Bermuda grass, and lespedeza.

Ochlockonee silt loam.—Ochlockonee silt loam differs from Ochlockonee fine sandy loam in that it is slightly lower lying and has a finer textured surface soil. The surface soil, to a depth ranging from 5 to 8 inches, is brown mellow friable silt loam containing a large amount of organic matter and clay. It was deposited by recent overflows. The subsoil consists of light-brown or brown clay or clay loam, mottled, at a depth ranging from 15 to 25 inches, by light gray and yellow. Many areas, too small to be shown on the soil map, of a light-gray poorly drained soil are included with this type. Water stands on these areas until late in the spring.

Ochlockonee silt loam is naturally a fertile soil, but because of its low-lying position and because it is subject to overflow, it is not, in the main, suitable for cultivated crops. Only a small proportion of the land is cleared and under cultivation, but yields are high where crops are not destroyed by overflow. The forested areas support a growth of old-field pine and of sweetgum, water oak, black gum, elm, maple, hickory, and other hardwoods. Corn, soybeans, and sorgo are well adapted to this soil but are subject to loss by overflow. On similar soils and under the same conditions in other parts of the State, Mammoth Yellow soybeans are grown because of their ability to withstand short periods of overflow. Johnson grass is also adapted to this soil. A short-maturing crop is needed for it. Carpet grass, Dallis grass, Bermuda grass, lespedeza, and partridge-peas are well adapted for pasture.

Guin soils, undifferentiated.—Guin soils, undifferentiated, include badly dissected and hilly areas of Ruston, Norfolk, Orangeburg, Susquehanna, and Akron fine sandy loams, fine sands, and clays, so intricately mixed that no soil type could be separated on a small-scale map. There are also inclusions of calcareous materials, especially at the bases of the hills adjacent to the prairie soils. On basal parts of the slopes and some of the lower divides are areas of an eroded phase of Sumter clay or Oktibbeha soils.

Guin soils, undifferentiated, are large continuous areas in the extreme northern part and to a less extent in the southern part in the vicinity of Carlowville. Small areas occur here and there throughout the county.

Areas of Guin soils, undifferentiated, consist of a series of rough, broken, hilly, and deeply eroded land. The streams have cut deep and very narrow valleys and by transportation and deposition help produce the broken relief and extremely mixed character of the surface soil. Drainage is excessive, and erosion is still very active. It would be impracticable to reclaim this land for agricultural purposes, and the land is of little value for pasture. Practically the entire area of Guin soils, undifferentiated, is used for forest, to which it is best suited. The character of the tree growth varies

considerably from place to place, depending largely on the character of the soil materials. Longleaf, yellow, old-field, and rosemary pines, together with oaks, hickory, and other hardwoods, prevail on the sandy lands and noncalcareous clays, and many cedars grow on the calcareous soils. Most of the virgin timber has been removed, but the greater part of the land now supports a second growth of old-field pine and hardwoods. A large part of this land is held as forest and game preserves. Beggar's-lice, pursley (Mexican-clover), partridge-peas, *Sesbania*, benne, black medic (on calcareous soils), and lespedeza are or can be grown in the sandy sparsely forested areas as quail feed. Dogwood, French mulberry, and other trees and shrubs also produce valuable bird feed.

Meadow (alluvial material).—The material classed as meadow (alluvial material) represents an intricately mixed and variable soil condition on the overflow bottoms. It has no uniform color, texture, or structure, and no type name can be assigned to it. It ranges in color from light gray and dark gray to brownish gray; in texture, from sand, fine sand, and fine sandy loam to clay and clay loam; and in structure, from loose sandy material to compact and heavy material. It has been washed from the higher lying soils and deposited along the stream courses during periods of overflow. It occurs as comparatively narrow strips along the streams that flow through the sandy uplands. As much of it lies only a foot or so above the normal water level of the streams, it is subject to frequent overflow, and a large part of it is saturated with water during the greater part of the year.

Only a very small percentage of this land is cleared and used for the production of crops. The crops grown are sugarcane, sorgo, corn, and fall garden crops. Fairly good yields of these crops are obtained. Cleared areas of this land, used as pasture, produce a good growth of carpet grass and lespedeza and furnish good grazing the greater part of the year. The wooded areas support a growth of sweetgum, together with bay, some oaks, and shortleaf pine. Gallberries, blackberries, and French mulberries are naturally adapted to this land, and partridge-peas, *Sesbania*, and benne can be grown on the better drained areas. They supply valuable quail feed.

Swamp.—Swamp differs from meadow (alluvial material) in that it is covered with water or is saturated throughout the year, and it is more uniform in texture, color, and structure than meadow. In most places the surface is dark gray, almost black, where considerable organic matter has accumulated. The texture ranges from sandy loam to clay. The subsoil is gray and ranges from fine sandy loam to clay, showing mottlings or shades of gray and brown. The largest areas of swamp are developed northeast of Selma along Beech Creek. Another area is along Rum Creek northwest of St. Pauls Church in the southern part of the county.

All the swamp land is covered with a dense growth of bay, cypress, tupelo gum, sweetgum, black gum, swamp pine, and many kinds of water-loving trees. To drain this soil would be difficult and expensive. If it were drained it would have some pasture value, being adapted to carpet grass and probably Bermuda grass,

and perhaps part of it could be used for the production of corn and hay. Under present conditions, it is best used for forestry. Wild ducks feed and hide in these areas during the day, and in a few areas feeds are planted for them.

Dune sand.—Southeast of Selma and about 3 miles south of Gardiners Island are a few small areas of dune sand. These sand dunes are narrow elongated ridges that rise about 15 or 20 feet above the surrounding soils. The material consists of coarse or medium gray or brownish-gray sand. Little or no organic matter is mixed with the sand. This sand is being used as building material to some extent in the vicinity of Selma. The dunes are almost treeless, with the exception of here and there a few scrubby sand oaks and a few longleaf pines.

LAND USES AND AGRICULTURAL METHODS

Practically all the soils of Dallas County are deficient in organic matter and mineral plant nutrients. They contained only a small amount when the lands were cleared of their native vegetation, and much of this has been lost through clean-cultural practices, leaching, oxidation, and erosion. The greatest needs of these soils, therefore, are large amounts of organic matter and mineral plant nutrients.

The ultimate aim of each farmer is to produce crops economically. A farmer must know the cropping system best suited to his soil, the quantity and quality of fertilizers required for each crop, the rotation of crops that best conforms to his farm set-up, the proper spacing of crops, and the proper use of abandoned areas from which he no longer has an income. No farmer is able to determine all these things for himself, consequently experiments were conducted at the Alabama Agricultural Experiment Station at Auburn and at five substations, at a number of experimental fields, and on farmer cooperative plots throughout the State on various soil types. Results obtained on the stations in the Coastal Plain should be applicable to the sandy soils of Dallas County, and results obtained at the Marion Junction Experiment Station should be applicable to the soils of the Black Belt part. Information obtained through these experiments is discussed in the section on Soils and Crops.

Dallas is one of the leading counties of the State practicing an improved system of agriculture. The county agent reports that 500,000 pounds of winter legume seed were planted in 1935. About 80 percent of this was hairy vetch, and most of the remainder, Austrian Winter peas. The growing of summer legumes, particularly soybeans and crotalaria, with corn, is increasing. On part of the soils that are adapted to general farm crops, a 2-year rotation is practiced: First year, cotton followed by vetch, Austrian Winter peas, or crimson clover; second year, corn, which is generally interplanted with soybeans. By this system corn yields have been increased about 15 or 20 bushels an acre, and cotton yields have been increased about 200 or 400 pounds of seed cotton an acre.

As the bottoms and swales have a special adaptation to corn and hay and the red uplands and badly sheet-eroded uplands to cotton, winter legumes, and oats, the type of crop rotation must be developed to fit the individual farm, depending on the amount of the different

soils present. Any clean-cultural farming system on upland soils should include a cover crop to be turned under. Winter legumes, such as hairy vetch, Austrian Winter peas, or crimson clover, are the best cover crops for this purpose on most soils, but crotalaria or lespedeza may be used successfully as summer legumes. The crotalaria is useful only as a soil-improving crop, but lespedeza is useful for hay and pasture as well.

Kudzu, a fast-growing perennial legume, has a place on practically every farm, being well adapted to all well-drained sandy upland soils. A large proportion of the farms have idle areas adjacent to the barn lot. If these areas were planted to kudzu, the appearance of the farm would be improved and at the same time green feed as a supplement for pasture would be produced. Kudzu is also valuable for stopping erosion when set along ditches and along badly eroded areas. In feeding value it compares favorably with other legumes. Kudzu is propagated by the use of root crowns, which must be set with extreme care. Two or three years' growth is necessary for it to develop and become well established. It may be cut and used as a hay crop, used for temporary grazing, or cut and used in the feed lot as a supplement to pasture during the summer.

Substantial terraces have been constructed on many of the farms, and as a result some farmers are cultivating rolling land that otherwise would be subjected to serious erosion. More interest and care is being taken in the construction of high broad-based terraces. Sheet erosion in the prairie or heavy clay soils is constant and very damaging, especially in the cultivated fields. For this reason, because of the natural adaptation of these soils to pasture grasses and because of boll-weevil infestations, a large part of this land has been converted into pasture land for the production of beef and dairy cattle. According to the report of the county agent, the largest cash income of the county is from cotton, that from dairy cattle and dairy products second, and that from beef cattle third.

Because cotton is the principal cash crop for this section of the State and practically all the farmers grow from a small to a large acreage of it, more study has been made by the experiment stations of its fertilizer needs than of the needs of all other crops. Results show that the best fertilizer for cotton on the average land of the county is one that supplies at least 36 pounds of nitrogen, 48 pounds of phosphoric acid, and 24 pounds of potash an acre. To supply these amounts of plant nutrients would require 225 pounds of nitrate of soda or its equivalent of nitrogen, 200 pounds of superphosphate (acid phosphate), and 48 pounds of muriate of potash or a 6–8–4 fertilizer applied at the rate of 600 pounds an acre. These amounts of plant nutrients may also be supplied by an application of 600 pounds of a 4–8–4 fertilizer and a side dressing of 75 pounds of nitrate of soda or the equivalent. In the event a farmer uses 3–10–3 fertilizer under cotton at the rate of 600 pounds an acre, the crop should be side-dressed with approximately 112 pounds of nitrate of soda or the equivalent. The cotton varieties recommended as the best producers and as growing a good staple are Cook 307, Clevewilt, Cook 144, and D. P. L.

As the cash income from the sale of beef and dairy cattle and dairy products ranks second in the county and first in the Black

Belt part, more stress should be placed on the care of the pastures. According to results obtained on the Black Belt soils at the Marion Junction Experiment Station, the following recommendations are made for the lime land: Black medic, Dallis grass, and white clover to be fertilized with 400 to 600 pounds of superphosphate. The white clover should be planted on the low-lying positions. On the acid soils the following recommendations are made: Common lespedeza and Dallis grass to be fertilized with 400 to 600 pounds of superphosphate. It is very necessary that all weeds be kept mowed.

Nitrogen is the principal fertilizer ingredient needed for the production of corn. The cheapest form is organic nitrogen obtained from turning under a winter cover crop that has been fertilized with lime or basic slag or by the use of barnyard manure. Should this organic form not be available, sodium nitrate applied at the rate of 150 to 225 pounds an acre as a side dressing when the corn is about 2 feet high is recommended. Only a small proportion of the corn grown in the county is fertilized with commercial fertilizers. The overflow bottoms and swales are the principal soils used for the production of corn and are naturally fertile, having very little need of additional fertilization. Some of the higher bottoms that are less subject to overflow need the fertilizations recommended. On recently cleared land or land that has never received any phosphate, the use of some phosphate in addition to the nitrogen may be found profitable.

The corn varieties recommended for the county are Whatley Prolific and Hastings Prolific.

Many of the farmers grow oats for early spring supplementary feed for the work animals. These, together with fields of vetch or Austrian Winter peas, furnish some winter grazing to cattle. Peas and vetch are sown in the fall, and oats also should be sown in the fall. Oats are usually fertilized in the early spring with an application of about 200 pounds of nitrate of soda or sulphate of ammonia.

Sorgo and sugarcane are grown on nearly every farm to make sirup for home use. These are generally planted on the moist soils. Many of the farmers feed the sorgo to work animals, hogs, and cows as a supplement to pasture. Some peanuts, peas, potatoes, and garden vegetables are grown on practically every farm to supply home needs.

A large amount of revenue has been realized in past years through the marketing of timber, but the present growth is small and returns little revenue compared with that received in the earlier period. In some sections small trees are being cut and sold to the paper mills to the extent of deforesting the land. For more economical returns, according to the State extension forester, forest fires should be eliminated; the more merchantable timber, such as pine, white and red oaks, hickory, poplar, ash, and cedar, should be protected in their respective habitats; and a large part of the tree growth should be allowed to reach maturity.

The production of fruits and vegetables occupies a small place in the agriculture of the county. A large number of scattered orchards and gardens supply enough produce for home needs and some for local markets, but not enough is grown to supply the

demands for the entire population. The soils and the climate are favorable for the production of fruit, as attested by the excellent quality of the peaches grown. Fruits, such as apples, pears, cherries, quinces, apricots, plums, muscadine and other grapes, dewberries, strawberries, and blackberries, and vegetables can be grown successfully.[4]

MORPHOLOGY AND GENESIS OF SOILS

Dallas County lies in the Red and Yellow soils region of the United States. The entire county is situated in the Gulf Coastal Plain. The soils have developed in a temperate climate with a rainfall of about 50 inches annually, a mean summer temperature of about 80° F., and a mean winter temperature of about 50°. The elevation of the county ranges from about 120 to 300 feet above sea level.

The soils, with the exception of the Rendzina group, including the Houston, Sumter, and Bell series, originally supported a forest growth of deciduous trees and pines. With the exception of the Houston and Bell soils, all the soils are light colored and contain a very small quantity of organic matter. The virgin areas of the forested soils contain a noticeable amount of vegetable matter in the uppermost 1 to 3 inches of the surface soils.

Within the memory of man, the calcareous soils in the prairie section have not supported forest growth worthy of mention, but grasses have grown for a long time, which accounts for the dark color and high content of organic matter in the Houston and Bell soils. In the Sumter soils, the most calcareous soils of the prairies, erosion in many places has kept pace with the weathering of the Selma chalk and the soil-forming processes, and consequently the surface soils are light colored.

In this region of heavy rainfall and warm temperature, leaching is continuous throughout the year, as the soil seldom freezes, and then only for short periods. Leaching or the washing out of the alkalies and alkaline earths from the sandy A horizon has been extensive and is still going on. This accounts for the fact that the surface soils contain less mineral plant nutrients than the subsoils.

Considerable geologic erosion occurred before this region was settled. Much additional erosion and gullying have taken place throughout the northeastern and the southeastern parts of the county as a result of clearing many of the steep slopes and of the misuse of the land in general farming operations. Deep V-shaped gullies and gulches have formed in these parts. Soils of the Rendzina group are subject to erosion. Many areas of Houston, Sumter, Vaiden, and Oktibbeha soils are eroded where poorly managed. Over part of the Sumter clay area sheet erosion has been destructive, in that the original surface layer of clay in many places has been removed, exposing the underlying Selma chalk formation. In the more hilly parts soils have also changed considerably as a result of the relocation of material from the higher to the lower positions.

[4] Further information on cultural practices may be obtained by consulting the county agent or by writing to the agricultural experiment station or the agricultural extension service at Auburn.

All the soils, with the exception of the Sumter, Houston, Bell, and Catalpa, range from slightly acid to strongly acid. Table 5 gives the pH values of the soil material from different horizons of several of the principal soils in various parts of the county.

TABLE 5.—*pH determinations of several soils from Dallas County, Ala.*[1]

Soil type and sample no.	Depth	pH	Soil type and sample no.	Depth	pH
Cahaba fine sandy loam:	*Inches*		Houston clay—Continued.	*Inches*	
417278	0 - 6	4.5	417229	14 - 30	8.0
417279	6 - 15	5.8	417230	30 - 54	7.8
417280	15 - 48	5.5	417231	54 -110	7.8
417281	48 - 60	5.3	Vaiden clay:		
417282	60 - 70	5.3	417232	0 - 4	5.6
417283	70+	5.3	417233	4 - 12	5.4
Norfolk fine sandy loam:			417234	12 - 40	6.7
417201	0 - 3	4.8	417235	40+	8.2
417202	3 - 10	4.8	Akron loam:		
417203	10 - 38	4.8	417236	0 - 4	5.5
417204	38+	4.7	417237	4 - 72	5.3
Oktibbeha clay:			417238	72 - 90	5.3
417205	0 - 4	7.3	417239	90 -120	5.3
417206	4 - 12	5.0	417240	120 -150	5.3
417207	12 - 18	5.0	417241	150 -190	5.3
417208	18 - 40	5.0	Amite fine sandy loam:		
417209	40+	8.1	417246	0 - 7	6.6
Leaf fine sandy loam:			417247	7 - 18	6.9
417210	0 - 2	6.4	417248	18 - 42	7.1
417211	2 - 6	6.4	417249	42 - 90	5.0
417212	6 - 15	5.3	417250	90 -108	5.3
417213	15 - 30	5.3	Red Bay fine sandy loam:		
417214	30 - 60	4.9	417274	0 - 7	5.8
417215	60 -100	4.9	417275	7 - 9	5.7
417216	100+	6.0	417276	9 - 50	4.9
Sumter clay:			417277	50 - 90	5.3
417217	0 - 5	8.2	Susquehanna clay:		
417218	5 - 11	8.2	417263	0 - 2	5.5
417219	11 - 30	8.2	417264	2 - 12	5.3
417220	30+	8.1	417265	12 - 30	4.6
Eutaw clay:			417266	30 - 60	4.6
417221	0 - 1½	6.0	417267	60+	4.6
417222	1½- 7	5.1	Orangeburg fine sandy loam:		
417223	7 - 12	5.2	417251	0 - 6	5.5
417224	12 - 50	5.2	417252	6 - 12	5.5
417225	50 - 80	7.8	417253	12 - 48	5.4
417226	80 -132	7.8	417254	48 - 70	5.5
Houston clay:			417255	70 - 90	5.5
417227	0 - 6	7.6	417256	90+	5.5
417228	6 - 14	7.7			

[1] Determinations made in the laboratories of the Bureau of Chemistry and Soils by the hydrogen-electrode method.

It will be observed from the data in table 5 that Norfolk fine sandy loam, Cahaba fine sandy loam, Orangeburg fine sandy loam, Akron loam, and Susquenhanna clay are the most acid of the well-developed upland soils. Eutaw clay, Vaiden clay, and Oktibbeha clay are acid to strongly acid in the surface soil and subsoil, but calcareous material is present at a depth of 6 feet under Eutaw clay and at slighter depths under Otibbeha clay and Vaiden clay. Sumter clay is highly calcareous throughout the profile.

Most of the soils of Dallas County are underlain by the Selma chalk and Ripley formations, with smaller areas of the Eutaw, Tuscaloosa, and Clayton.[5] The Selma chalk formation, or rotten limestone, was deposited on the sea floor at the end of the Cretaceous period and was doubtless formed as calcareous, more or less muddy oozes which gradually accumulated on the bottom of a clear and

[5] ADAMS, G. I., BUTTS, C., STEPHENSON, L. W., and COOK, W. GEOLOGY OF ALABAMA. Ala Geol. Survey. Spec. Rept. 14, 312 pp., illus. 1926.

moderately deep sea. This formation is white or very light gray chalky limestone. It underlies all the prairie sections. From the weathered products of this soft limestone the Rendzina soils, Houston, Sumter, and Bell, are developed.

Closely associated with these calcareous soils are the Oktibbeha, Vaiden, and Eutaw soils, which probably are derived from beds of heavy clays superimposed on the Selma chalk formation. The Selma chalk is reached at 2 to 5 feet below the surface in the Oktibbeha clay, whereas the calcareous material under the Vaiden and Eutaw soils is usually encountered from 5 to 8 feet below the surface.

In the northern projection and the southeastern part of the county the Eutaw formation, together with a small area of the Tuscaloosa formation, is developed. The Eutaw formation consists of thinly bedded and laminated light-gray and bluish-gray clays and yellow fine micaceous sandy material, whereas the Tuscaloosa formation consists of light-colored irregular or cross-bedded bodies of sands, sandy clays, clays, and some gravel. The soils developed from these formations are mainly Orangeburg, Ruston, Red Bay, and Susquehanna soils and large continuous areas of Guin soils, undifferentiated.

The Ripley formation consists of gray or greenish-gray sand and clay, calcareous and glauconitic in some layers. In the vicinities of Orrville, Sardis, Pleasant Hill, and Carlowville are broad nearly level sandy plains, the underlying materials being beds of sand and sandy clays, with some sand and gravel strata. These materials were evidently laid down over the Ripley formation at a time when Alabama and Cahaba Rivers were wider streams or estuaries emptying into the Gulf. These materials give rise to the Norfolk, Orangeburg, Red Bay, Ruston, and Plummer soils, and, in places, to Guin soils, undifferentiated. The Red Bay, Orangeburg, Ruston, and Norfolk soils have friable fine sandy clay B horizons. The C horizons of the Red Bay and Orangeburg soils contain much sand and some rounded small gravel. Southeast of Summerfield a mixture of Ripley and Eutaw formations gives rise to the Akron soils.

Extensive areas of first bottoms and second bottoms, or terraces, are developed along Alabama and Cahaba Rivers and other streams. The old alluvial material on some of the second bottoms has lain in its present position under good drainage for a sufficient length of time to develop normal soil profiles. The Amite, Cahaba, Kalmia, and Wickham soils are the well-drained soils developed from these alluvial deposits, and the Leaf, Myatt, and Augusta soils are the associated poorly drained soils. In the first bottoms along all the streams, except those rising in and flowing through the prairie region, are areas of Ochlockonee soils, meadow (alluvial material), and swamp, whereas Catalpa clay owes its origin to the deposition of materials washed from the calcareous soils of the prairies and the associated heavy clay soils.

On the basis of soil development, two main groups of soils and land types are in Dallas County; namely, those with normal soil profiles and those that have not developed normal soil profiles.

The first group is represented by the Ruston, Orangeburg, Red Bay, Blakely, Norfolk, Kalmia, Wickham, Cahaba, and Amite series. The most striking features of the profile of these well-developed soils are a comparatively light textured A horizon; a heavier textured, more uniformly colored, and more thoroughly oxidized B

horizon; and a deeper, or C, horizon, which may vary considerably in texture and color but which in most places is heavier than the A horizon and lighter textured than the B horizon. These soils show the influences of eluviation in the A horizon and of illuviation in the B horizon, and they are the most thoroughly aerated and best drained soils in the county.

Orangeburg fine sandy loam may be considered as one of the normally developed soils of the county and a soil which expresses the climatic influences of the region. A description of a profile of a virgin area as observed 4 miles northwest of Pleasant Hill is as follows:

A_1. 0 to 2 inches, dark grayish-brown fine sandy loam.
A_2. 2 to 6 inches, yellowish-brown fine sandy loam. These two layers are mellow and friable and contain numerous grass roots and organic matter.
A_3. 6 to 12 inches, brownish-yellow or yellowish-brown fine sandy loam or loamy fine sand, which is mellow and friable.
B_2. 12 to 48 inches, bright-red or yellowish-red friable fine sandy clay. This material has irregular breakage, and the breakage planes are coated with a slightly darker red than the insides of the particles. It breaks down into a friable mass.
B_3. 48 to 70 inches, light-red friable fine sandy clay mottled with bright yellow. This layer has no definite breakage, is of lighter color, and is more friable than the layer above.
C_1. 70 to 90 inches, yellow or reddish-yellow heavy fine sandy loam mottled with bright red and gray.
C_2. 90 inches +, slightly compact interstratified sandy material of a splotched red, gray, and yellow color.

The Red Bay soils differ from the Orangeburg soils in having a reddish-brown or red A horizon and a slightly darker red B horizon. The C horizon of the Red Bay soil ranges from loamy sand to sandy clay material and usually contains a large amount of gravel.

Norfolk fine sandy loam, as observed three-fourths mile east of Sardis, has the following profile:

A_1. 0 to 3 inches, dark-gray fine sandy loam containing partly decomposed vegetable matter.
A_2. 3 to 10 inches, grayish-yellow fine sandy loam. These two layers are mellow and friable.
B. 10 to 38 inches, yellow friable fine sandy clay of uniform color. This material has no definite fracture planes but breaks into irregularly shaped lumps which crush into a friable mass, or crumb structure.
C. 38 inches +, the parent material, which consists of slightly compact brittle fine sandy clay material streaked with reddish brown, gray, and yellow.

Soils of the Ruston series are intermediate in color characteristics between the Norfolk soils and the Orangeburg soils. The Akron soils are characterized by a brown or reddish-brown A horizon and a dark-red heavy compact extremely stiff clay B horizon.

The second group, the soils of the Susquehanna, Augusta, Leaf, Myatt, and Ochlockonee series, and meadow (alluvial material), swamp, and Guin soils, undifferentiated, have not developed normal soil profiles. In all these soils and land types, except the soils of the Susquehanna series and Guin soils, undifferentiated, this failure to develop a normal profile is due to imperfect drainage and a high water table. The soils of the Susquehanna series and Guin soils, undifferentiated, represent the conditions brought about largely through mixtures of materials or through gullying and sheet erosion.

The Rendzina soils developed from the Selma chalk and Ripley

formations, including those of the Houston, Sumter, and Bell series, have not developed normal soil profiles, but differences between the surface soil and the subsoil are marked in some places.

In profile development, Houston clay is a Rendzina soil. The Rendzina soils include those developed under grasses from parent material so high in its content of available lime that the normal profile has not developed. The Houston soil owes its black color to the preservation of organic matter through the agency of lime inherited from the parent material rather than to the climatic forces of the region. In this climate the tendency would be for Houston clay to lose its organic matter and free calcium carbonate and finally to develop a red B horizon.

The Sumter soils have light-gray or yellowish-gray A horizons and pale-yellow, grayish-yellow, or creamy-white B horizons, and, in most places at depths ranging from 20 and 40 inches, the soil material grades into white blocky Selma chalk or sandy limestone.

Bell clay is developed around the drainage heads and on very gentle slopes in the prairies, and in part it has developed from alluvium washed from the surrounding Houston, Sumter, and Oktibbeha soils. Catalpa clay differs from Bell clay in that it is lighter in color and is alluvial material deposited in the first bottoms by streams rising in and flowing through the prairies.

The Oktibbeha, Vaiden, and Eutaw soils are part prairie and part forested soils. The main differences among these soils are probably due to the thickness of the heavy clay material overlying the Selma chalk. Where the clay material is thin, a soil profile, such as that of Oktibbeha clay, has developed which, in its color characteristics, expresses to some degree the climatic influences of the region. The calcareous material is reached in most places at a depth ranging from 20 to 50 inches below the surface, and this has resulted in better drainage, aeration, and oxidation of the overlying clays. This is by far the best oxidized soil in the prairie section. Vaiden clay, from the standpoint of oxidation and aeration, is intermediate between brown Oktibbeha clay and poorly drained Eutaw clay.

The Rendzina soils and the soils that are part prairie and part forested [6] are characterized by having colloidal fractions, the chemical composition of which shows a molecular ratio of silica to alumina of about 1.8. The order of magnitude of the buffer and base-exchange capacities varies inversely with the degree of weathering, or these could be expressed as varying inversely in order of magnitude with the silica-sesquioxide ratio. Eutaw clay, with a ratio of 2.31, is highly mottled yellow and gray clay, and Oktibbeha clay, with a ratio of 1.90, is uniformly red. Baver, working with these clay soils, found that Eutaw clay was more plastic than Oktibbeha clay. The plasticity of these soils also ranged in order of magnitude with the silica-sesquioxide ratio. Houston and Sumter clays were the least plastic, a result which would be expected because of their high calcium content.

SUMMARY

Dallas County is located in the west-central part of Alabama and includes some of both the prairies and the sandy uplands. The

[6] SCARSETH, G. D. MORPHOLOGICAL, GREENHOUSE, AND CHEMICAL STUDIES OF THE BLACK BELT OF ALABAMA. Ala. Agr. Expt. Sta. Bull. 237, 48 pp., illus. 1932.

prairie section comprises the western part and a small area at the extreme southern side of the county. The county has four distinct topographic divisions: The prairies, the central plains or high terraces, the river terraces and first bottoms, and the hilly uplands. Each division possesses distinct surface relief. The county is well drained, for the most part, by Alabama and Cahaba Rivers and numerous tributary streams. The elevation ranges from about 120 to more than 300 feet above sea level. An abundant supply of good drinking water from wells, springs, and artesian wells is obtained in various parts of the county.

The county is well supplied with railroad facilities, navigation on Alabama River, and paved highways and good sand-clay and gravel-surfaced roads. In Selma are cotton mills, a cottonseed-oil mill, a peanut-oil mill, a creamery, a lumber mill, and several other industries. This city, together with Montgomery and Birmingham, affords markets for various farm and manufactured products.

The climate is mild, equable, and healthful and, in conjunction with the wide variety of soils, favors a diversified agriculture. Hardy vegetables can be grown during the winter, and the grazing season for cattle ranges from 9 to 10 months a year.

Dallas County is one of the leading agricultural counties in the State. Cotton, corn, hay, beef cattle, dairy products, and peanuts are the staple farm crops. These are supplemented by many subsistence crops. A direct relationship exists between the agriculture and the two main groups of soils.

Throughout the sandy uplands and on the river terraces a more diversified and self-sustaining type of agriculture is practiced than on the prairies. The Ruston, Orangeburg, Red Bay, Norfolk, and Akron soils of the uplands and the Cahaba, Amite, Kalmia, and Wickham soils on the terraces are well suited to the production of cotton under boll-weevil conditions. They warm early in the spring, are well drained, have friable subsoils, respond readily to fertilization, and are easily tilled. Cotton matures, for the most part, ahead of the boll weevil. Practically all the peanuts, most of the corn, and a great amount of the garden vegetables, sweetpotatoes, pecans, and fruits are produced on these soils.

The soils of the prairies and their associates produce the bulk of the hay and furnish pasture for cattle. The Houston and Bell soils are potentially productive soils and, because of the large quantity of organic matter contained in them and their better moisture conditions, are the best soils in the prairies for corn and for grazing. Prior to the advent of the boll weevil in 1914 the prairie soils and associated clay lands, such as the Oktibbeha, Vaiden, and Eutaw soils, were used extensively for the production of cotton. These soils, because of their heavy texture and structure, mature cotton late, and much of the crop is destroyed by the boll weevil. This condition has forced the farmer to raise cattle and produce hay, particularly Johnson grass; and dairying has supplanted cotton growing to a large extent.

The soils and land types having rough, broken, and eroded surface relief, particularly in the uplands, and the sands and the poorly drained soils in the bottoms should be devoted to forest and pasture.

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